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## A Socio-Psychological Study of Fifty-three Supernormal Children

BY

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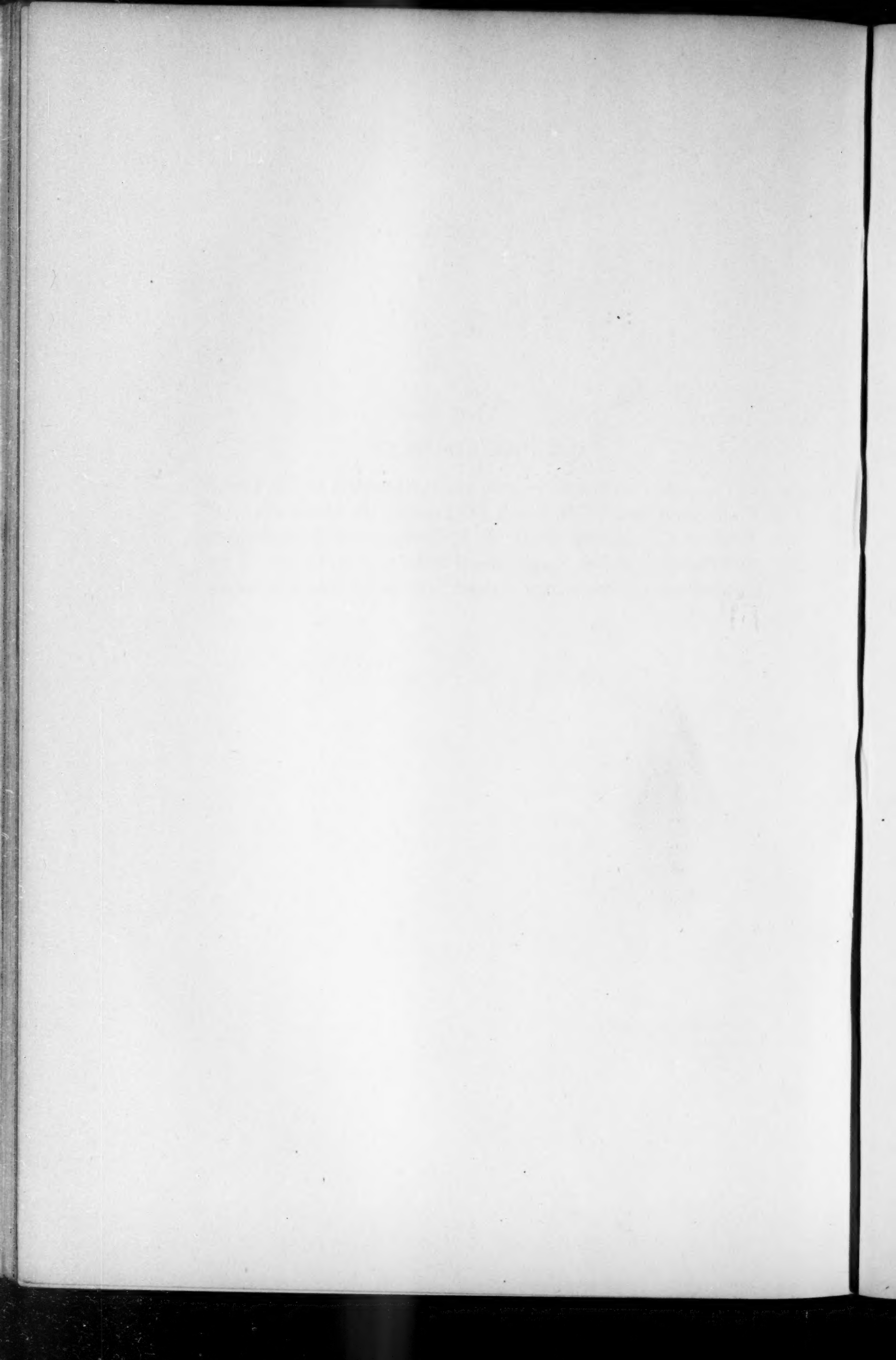
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## INTRODUCTION

*Why the study was undertaken.* Two factors were instrumental in arousing the experimenter's interest in the so-called supernormal child. First, the importance to the state of superior children is a matter needing no comment. The past few years have brought forth a flood of literature on the care and training of subnormals and defectives. If children below par are worth the additional expense of small classes and highly individualized instruction, surely the supernormal is worthy of as much consideration.

In the second place, the lack of information concerning the factors making for superiority give the subject peculiar interest. The mental make-up of superior children, the possibility of certain characteristics common to all of them, their home life, training, and relation to school constitute interesting and valuable subjects for investigation.

*The aim of the study.* The present study attempts to trace out some of the factors, both social and psychological, found with a group of children purported to be superior. The aims may be roughly analyzed under the following headings:

- I. Psychological.

- a. Through the Stanford Revision of the Binet Tests to contrast the behavior of a group of superior children with a norm-group.

- b. Through a series of selected psychological tests, for which norms have been established, to again contrast the superior with a norm-group. (Tests described and treated in detail in the following section.)

- c. Throughout the performance of all psychological tests of whatever nature to note the individual differences in:

- 1) Methods of procedure, imagery, associative and mnemonic devices.

- 2) The qualitative character of the response.

- 3) The nature of the concepts of the subjects, and to try to discover to what extent such concepts may be rationally accounted for by definite systems of training, by incidental education, and by the social milieu.

4) The factors making for success or failure of a particular subject in a particular test.

d. Through the case descriptions to evaluate the test in the light of the qualitative character of the performance and the social data, as well as to evaluate the individual through the tests. The burden of proof is with the test which is set up as a criterion for individual performance.

e. By the use of correlation methods to note any evidences of common, central, or group factors.

2. Social data. (See case histories and tabulation V, Appendix.)

a. To evaluate, in so far as possible, the cultural conditions of the home: general culture, mores, religion, philosophical attitudes, special cultures, aims, ambitions, and so on.

b. To consider carefully the factors of incidental and home training along with family traditions and ideals in their bearing on the formation of certain habits in the nature of ambitions, interests, pride, confidence in ability, maintenance of reputation, etc.

c. To bring together a summary of the social and educational factors which have been operative in producing a superior type of adjustment, in the hope that some inference may be carried over to practical problems in education.

3. School data, and the estimates of teachers. (See case histories and Tabulation V, Appendix).

4. Physical and health data. (See Tabulation V, Appendix.)

*Definition of superior or supernormal.* The writer has no intention of attempting to adequately define either intelligence or mental superiority. The terms superior and supernormal have been used interchangeably, chiefly to avoid unpleasant repetition. The children in this study have been designated as supernormal in mentality. They consist largely of pupils who, in the opinion of teachers and those in a position to judge, are markedly above other children of their own age in mental performance. Several of the subjects have been selected for conspicuous superiority in music, and in a few cases the children have attracted public attention on account of their precocity. Everything considered,



the term mentally superior has been used in its commonly accepted sense of bright, quick to learn, clever, talented. The subjects have not been referred to as "genius" in any case.

*Selection of subjects.* The selection of the subjects may be divided into two phases: (1) Preliminary selection; (2) Final selection.

*Preliminary selection.* In a general way, through classes of students in the Los Angeles State Normal School, principals, teachers, and educational friends, the writer secured all the information possible of cases purporting to be of superior intelligence, capability, or talents. All such cases were given consideration, and many talented children, especially in music, were selected in this way. Newspaper accounts of exceptional children were also followed up. A large number of the children were selected by a systematic hunt from the first grade to and including the high school.<sup>1</sup> Principals and teachers were asked to present lists of possible cases, using the following criteria:

1. The names of all pupils deemed exceptionally intelligent. Not necessarily good students.
2. The names of those particularly thoughtful or good reasoners.
3. The names of those showing exceptional ability along some one line.
4. The names of those exceptionally young for their grade.
5. The names of those very large for their age and grade but doing more than average work.
6. If in doubt, put down the name of the pupil in question.

The lists received were fairly large, and as a rule only a few were retained in final selection. It should be noted that the group with the highest I. Q. was selected from reported cases and not from systematic examination in the public schools. In fact, if the experimenter had been confined to the schools, it would have resulted in the loss of some of the most interesting subjects who were not in attendance at public school.

<sup>1</sup> The experimenter is indebted to Dr. Albert Shields, Superintendent of the Los Angeles City Schools, for permission to select subjects from the Los Angeles City Schools.

Final selection. Final selection was based upon two factors: (1) Binet Test scores; (2) Special ability along some line. With but few exceptions (discussed in the case descriptions), the following I. Q. was required in order that the subject be retained:

Age 7 to 12 (inclusive) I. Q. 135 or more

Age 13 to 15 (inclusive) I. Q. 120 or more

It is obvious that as age increases the range for superior I. Q. decreases.<sup>2</sup> This is the justification for lowering the I. Q. standard for final choice of children 13 years of age or more. Regarding the second factor, the Binet score was ignored in a few cases where there was very great evidence of superior ability along some special line. Such a child may justly be considered superior according to the experimenter's definition, regardless of his I. Q. It is interesting to note, however, that in all such cases the I. Q. is relatively high. The most striking exception is XIII A with an I. Q. of 116.6. The question of serious sensory defect did not arise.

*Designating the subjects.* In all of the tabulations the subjects are grouped according to age. The subject is referred to by Roman numeral and letter; thus, XIII A indicates that the child is 13 years old (chronological age), while the A completes the identification of the individual and his location in the tabulations. A child from 6 years, 7 months, through 7 years, 6 months, is considered 7 years of age, and so on with each age.

*General factors of selection.* With but one exception (a girl of 6), the subjects range from 7 to 15 years (inclusive). All are of the Caucasian race, and all speak English fluently.

<sup>2</sup> The highest possible age score in the Stanford Revision is 19½ years. The older the subject, the less the range for superior performance. For example, a child of 7 years has 12½ years of range in superior age; the 14-year-old child has but 5½ years of superior range. The first subject has a possible I. Q. of 278.5, and the latter a possible I. Q. of 139.3. The younger subjects have the advantage of picking up several months of credit towards their mental age beyond their range of complete performance. This advantage is denied to the older subjects. For example, several of the 14- and 15-year superiors performed all but one or two of the high adult tests; if 20-, 21-, and 22-year tests existed, they would in all probability include them in their range of partial performance, thus adding several months, or even a year or two, to their mental age.



## OUTLINE OF PSYCHOLOGICAL EXPERIMENTS

- I. Attention. Simultaneous Addition. (Tab. I.)
- II. Association.
  - a. Uncontrolled. Three-minute free association from Binet series. (Tab. I.)
  - b. Controlled. (Tab. III.)
    - Opposites
    - Part-Whole
    - Genus-Species
- III. Phases of Learning. Association.
  - a. Rote or Mechanical Memory. Binet Letter-Square. (Tab. I.)
  - b. Associative Learning. Substitution Test. Symbol-Digit. (Tab. II.)
  - c. Linguistic Ability. (Tab. III.)
    - Directions Test A. B. and C.
    - Trabue Completion Test. B. and C.
  - d. Changing associative adaptation. Analogies Tests. A. B. and C.
  - e. Associative Memory. Marble Statue. (Tab. III.)
- IV. Phases of Adaptation. Rational Logical Resourcefulness. (Tab. IV.)
  - a. Code Test from the Binet series.
  - b. Induction Test from the Binet series.
  - c. Healy-Fernald Construction Puzzle.
  - d. Proverbs Test.
  - e. Relative Values Test.
  - f. Problem of Squares. (Only performed by a few subjects.)
  - g. Problem of Triangles. (Only performed by a few subjects.)

Tabulation numbers refer to the appendix where the scorings are all brought together.

## SIMULTANEOUS ADDITION

*Description of the experiment.* In this test the subject is asked to add 1 successively and continuously to three different numbers, 6, 28, and 43. The numbers are given to the subject verbally, and the partial sums must be retained mentally. The process is then as follows: 6, 28, 43; 7, 29, 44; 8, 30, 45; 9, 31, 46; etc. (Whipple, Manual of Mental and Physical Tests, Vol. I, 338, ff.) It has been noted in giving the test that the subject tends to make errors that simplify the problem. This consists largely in reducing tens or units of the successive numbers to an identity: thus, 6, 28, 43; 7, 29, 49; 8, 30, 48; 9, 39, 49; etc. In order to avoid this simplification of the test and also to keep the subject aware of errors, the test has been modified as follows: The experimenter held the check sheet shown here. In case of error or lapse of memory on the part of the subject, E at once corrected the error or restored the lost series. At the same time the experimenter noted the error on the check sheet, totaling the same, as indicated, at the foot of the score card. Thus the check sheet became the personal record of that subject showing both the number and character of the mistakes made. The adding was kept up continuously for 15 minutes. At the end of every 5-minute period, a line was drawn across the check-sheet, making it possible later to compare the rate of work of the subject for three successive 5-minute periods as well as note the comparative frequency of errors and lapses. In case the subject completed the additions through 106, 128, 143, in less than 15 minutes, he was instructed to continue 7, 29, 44, etc.

*Method of procedure.* The nature of the test was carefully explained to the subject by means of a preliminary set of numbers, 2, 11, 30 and he was allowed to make four or five additions, making sure he understood the nature of the problem. He was then given the following instructions: "I am now going to give you a new set of numbers, and I want you to keep adding 1 to each one until I tell you to stop. If you do not add correctly,



SIMULTANEOUS ADDITION

1	6	28	43	26	31	53	68	51	56	78	93	76	81	103	118
2	7	29	44	27	32	54	69	52	57	79	94	77	82	104	119
3	8	30	45	28	33	55	70	53	58	80	95	78	83	105	120
4	9	31	46	29	34	56	71	54	59	81	96	79	84	106	121
5	10	32	47	30	35	57	72	55	60	82	97	80	85	107	122
6	11	33	48	31	36	58	73	56	61	83	98	81	86	108	123
7	12	34	49	32	37	59	74	57	62	84	99	82	87	109	124
8	13	35	50	33	38	60	75	58	63	85	100	83	88	110	125
9	14	36	51	34	39	61	76	59	64	86	101	84	89	111	126
10	15	37	52	35	40	62	77	60	65	87	102	85	90	112	127
11	16	38	53	36	41	63	78	61	66	88	103	86	91	113	128
12	17	39	54	37	42	64	79	62	67	89	104	87	92	114	129
13	18	40	55	38	43	65	80	63	68	90	105	88	93	115	130
14	19	41	56	39	44	66	81	64	69	91	106	89	94	116	131
15	20	42	57	40	45	67	82	65	70	92	107	90	95	117	132
16	21	43	58	41	46	68	83	66	71	93	108	91	96	118	133
17	22	44	59	42	47	69	84	67	72	94	109	92	97	119	134
18	23	45	60	43	48	70	85	68	73	95	110	93	98	120	135
19	24	46	61	44	49	71	86	69	74	96	111	94	99	121	136
20	25	47	62	45	50	72	87	70	75	97	112	95	100	122	137
21	26	48	63	46	51	73	88	71	76	98	113	96	101	123	138
22	27	49	64	47	52	74	89	72	77	99	114	97	102	124	139
23	28	50	65	48	53	75	90	73	78	100	115	98	103	125	140
24	29	51	66	49	54	76	91	74	79	101	116	99	104	126	141
25	30	52	67	50	55	77	92	75	80	102	117	100	105	127	142
												101	106	128	143

SCORE

		No. added	No. errors	No. lapses	No. mistakes	Cor. added	Total No.
5	Minutes.....						
10	" .....						
15	" .....						
	Totals .....						

I shall give you the correct number. If you forget the number at any time I shall help you out at once. Do not get discouraged if you make several mistakes. Work as fast as you can, but try not to make mistakes."

*Aim of the test.* The test would seem to measure:

1. Simultaneous (immediately successive) attention to three distinct series of mental acts, capable of evaluation both quantitatively and qualitatively. This is sometimes referred to as "range of attention," and sometimes as "range of consciousness."

2. Persistent and continuous application to an exacting and monotonous task, demanding a high degree of attention.

*Results.* As no norms existed for this test, it was standardized by using as large a number of children as conditions permitted. (Tabulation A.) Norms below 10 years of age were not used owing to the failure of so many of the children to perform the test. It should be noted that throughout the norms are based on the averages, which on the whole seems best. However, in this test the median for the number of correct additions is much higher than the average. This is due to the fact that at every age there were a few subjects whose performance was so low as to make a sharp cleavage from the line of gradual decline, forming, in fact, a sub-group by themselves. This sub-group never acquired the slightest "swing" in performance. Debarring these subjects, the scores for correct addition would range from 20 (lower ages) to 40 (upper ages) higher than given in the tabulation of the norms.

1. Making allowance for the fact that the norms are probably too low, the accompanying tabulations indicate the superiority of the supernormal group over the average child of the same chronological age, both as regards number of correct additions and the percentage of accuracy. Considered by groups, the superiors are about three years ahead of the average child of the same age both in quantity and quality score. (See Appendix, tabulation II, and the accompanying tabulations A and B.)

2. There is, however, a comparatively low correlation between the Simultaneous Addition Test and the other tests given. (See Correlations Tabulation C.) This is accounted for by the fact that while the group average for the superiors is high, nearly all making a score higher than the corresponding norm for the same chronological age, *within* the superior group the degree of superiority is but roughly comparable either to the rank by chronological age or mental age. (See Appendix tabulation II, "No. of Correct Additions," totals column.)

3. Introspections. The introspections reveal a variety of methods of procedure, including imagery and devices for re-



SIMULTANEOUS ADDITION  
Norms  
Tabulation A

Age	End of 5 Minutes					End of 10 Minutes				End of 15 Minutes				Totals					
	No. of Cases	Ave. No. Additions	Ave. No. Errors	Ave. No. Lapses	Ave. No. Mistakes	Ave. No. Additions	Ave. No. Errors	Ave. No. Lapses	Ave. No. Mistakes	Ave. No. Additions	Ave. No. Errors	Ave. No. Lapses	Ave. No. Mistakes	Ave. No. Additions	Ave. No. Errors	Ave. No. Lapses	Ave. No. Mistakes	Ave. No. Cor. Addits	% Correct
10	41	60.5	8.8	4.3	13.1	38.0	9.6	5.1	14.7	32.8	12.6	6.4	19.0	131.3	31.0	15.8	46.8	84.5	65
11	38	65.1	8.4	4.1	12.5	49.0	7.7	4.8	12.5	46.8	11.7	5.4	17.1	160.9	27.8	14.3	42.1	118.8	74
12	50	73.1	13.5	4.3	17.8	64.5	16.0	2.8	18.8	59.5	13.3	2.8	16.1	197.1	42.8	9.9	52.7	144.4	73
13	30	76.0	10.3	4.3	14.6	68.4	15.0	2.6	17.6	60.2	13.0	3.3	16.3	204.6	38.3	8.2	48.5	156.1	76
14	28	92.3	13.3	3.7	17.0	76.1	13.5	3.1	16.6	68.2	12.9	2.9	15.8	236.6	39.7	9.7	49.4	187.2	77
15	36	94.0	14.7	2.8	17.5	76.8	16.5	2.4	18.9	77.4	18.3	1.8	20.1	248.2	49.5	7.0	56.5	191.7	77
16	29	96.7	13.1	1.5	14.6	74.3	16.3	2.1	18.4	70.7	17.1	1.9	19.0	241.7	46.5	5.5	52.0	189.7	79
17	25	103.4	12.4	1.6	14.0	71.5	10.3	2.2	12.5	72.8	11.8	2.0	13.8	247.7	34.5	5.8	40.3	207.4	84
18	31	101.8	10.1	1.4	11.5	80.0	11.7	1.6	13.3	77.9	12.1	2.3	14.4	259.7	33.9	5.3	39.2	220.5	85

SIMULTANEOUS ADDITION  
Norms and Scores for Superiors Compared

Tabulation B

Chronological Age	Norms			Superior Children		
	Total No. Mistakes	Total No. Cor. Add's	% of Cor. Add's	Total No. Mistakes	Total No. Cor. Add's	% of Cor. Add's
7				23	94	82
8				33.3	144.7	82
9				32.3	126.6	86
10	46.8	84.5	65	31.0	131	81
11	42.1	118.8	74	32.5	176	84
12	52.7	144.4	73	28.4	212.2	88
13	48.5	156.1	76	35.4	332.1	90
14	49.4	187.2	77	29.2	306.5	90
15	56.5	191.7	77	22.6	325.9	93
16	52	189.7	79			
17	40.3	207.4	84			
18	39.2	220.5	85			

taining the numbers. A majority of the most rapid subjects retained the three numbers of the series by *kinaesthetic verbal sensory set*. This seems to be a neuro-muscular impulse and swing that is not lost from series to series (*i. e.*, from 3, 28, 43, to 7, 29, 44). The set for all three columns of counting seems to be retained; thus, 6, 7, 8, 9, 10, etc., and 28, 29, 30, 31, 32, etc., and also, 43, 44, 45, 46, etc. This is really a case of keeping three distinct counting habits in operation successively, in which a high degree of attention and a rapidly swinging rhythm is necessary. No subject used this method entirely, some never. However, this procedure was much more frequent with the children of the superior group than with those used in establishing the norms. In case of a halt in the rhythm, visual imagery and kinaesthetic verbal imagery seem to be appealed to about equally in the attempt to reinstate the numbers. Several noted, after a few minutes' addition, the numerical relation between the columns (*e.g.*, 6, 28, 43, is 6 plus 22, and 28 plus 25). Thus, by retaining column one kinaesthetically or visually or by auditory imagery, the other columns could be found by computation. However, in practice, those who noted this numerical relationship did not make much use of it, except when they made an



error of which they immediately became conscious, or when they had a lapse of memory. A majority of the subjects used a mixed imagery, and it is hard to say which predominated—visual, auditory, or kinaesthetic verbal. Many seemed to retain the first column visually and “just said the others.” It is impossible to say what this other method of retention is. In some cases, after a long pause, in which undoubtedly the numbers had totally disappeared from consciousness, they were correctly recalled. Here kinaesthetic verbal imagery, or possibly auditory imagery, is brought into play. With these subjects in this phase of the work, the test is measuring neither range of attention nor range of consciousness, but immediate recall. With others, or with the same subjects at different times, when the procedure is more fluent, the test is probably measuring range of consciousness, and the columns are being retained at a sub-level by a neuro-muscular throat sensation that never entirely leaves consciousness. Of course, the more rapid the procedure, the less likely is this continuity of sensations to disappear. A large number used visual imagery in recalling all three columns throughout the test, with a mixture, of course, of other imageries. This mixed, but visually predominant type, shows as a rule more outward signs of effort of attention. Many of the subjects started with a kinaesthetic verbal flow that was very inaccurate, but, after a few errors had been made, proceeded more cautiously, while the method of work becomes more visual in character, and the kinaesthetic verbal process became more conscious. *In other words, an attitude of greater caution, due to corrected errors, tended to change the process from one of range of consciousness to one of immediate recall.* There were several subjects who depended upon verbal flow so long as the numbers could be retained in the range of consciousness, but who depended upon visual imagery to reinstate the number if completely lost. Nearly all of the older subjects stated that they felt (were aware) they would be able to recall a number before they actually came to it, and that they knew beforehand when they had lost one of a series. In conclusion, it may be said that no subject used a

SIMULTANEOUS ADDITION Tabulation B  
 Norms and Scores for Superiors Compared

Chronological Age	Norms			Superior Children		
	Total No. Mistakes	Total No. Cor. Add's	% of Cor. Add's	Total No. Mistakes	Total No. Cor. Add's	% of Cor. Add's
7				23	94	82
8				33.3	144.7	82
9				32.3	126.6	80
10	46.8	84.5	65	31.0	131	81
11	42.1	118.8	74	32.5	176	84
12	52.7	144.4	73	28.4	212.2	88
13	48.5	156.1	76	35.4	332.1	90
14	49.4	187.2	77	29.2	306.5	90
15	56.5	191.7	77	22.6	325.9	93
16	52	189.7	79			
17	40.3	207.4	84			
18	39.2	220.5	85			

taining the numbers. A majority of the most rapid subjects retained the three numbers of the series by *kinaesthetic verbal sensory set*. This seems to be a neuro-muscular impulse and swing that is not lost from series to series (*i. e.*, from 3, 28, 43, to 7, 29, 44). The set for all three columns of counting seems to be retained; thus, 6, 7, 8, 9, 10, etc., and 28, 29, 30, 31, 32, etc., and also, 43, 44, 45, 46, etc. This is really a case of keeping three distinct counting habits in operation successively, in which a high degree of attention and a rapidly swinging rhythm is necessary. No subject used this method entirely, some never. However, this procedure was much more frequent with the children of the superior group than with those used in establishing the norms. In case of a halt in the rhythm, visual imagery and kinaesthetic verbal imagery seem to be appealed to about equally in the attempt to reinstate the numbers. Several noted, after a few minutes' addition, the numerical relation between the columns (*e.g.*, 6, 28, 43, is 6 plus 22, and 28 plus 25). Thus, by retaining column one kinaesthetically or visually or by auditory imagery, the other columns could be found by computation. However, in practice, those who noted this numerical relationship did not make much use of it, except when they made an



error of which they immediately became conscious, or when they had a lapse of memory. A majority of the subjects used a mixed imagery, and it is hard to say which predominated—visual, auditory, or kinaesthetic verbal. Many seemed to retain the first column visually and “just said the others.” It is impossible to say what this other method of retention is. In some cases, after a long pause, in which undoubtedly the numbers had totally disappeared from consciousness, they were correctly recalled. Here kinaesthetic verbal imagery, or possibly auditory imagery, is brought into play. With these subjects in this phase of the work, the test is measuring neither range of attention nor range of consciousness, but immediate recall. With others, or with the same subjects at different times, when the procedure is more fluent, the test is probably measuring range of consciousness, and the columns are being retained at a sub-level by a neuro-muscular throat sensation that never entirely leaves consciousness. Of course, the more rapid the procedure, the less likely is this continuity of sensations to disappear. A large number used visual imagery in recalling all three columns throughout the test, with a mixture, of course, of other imageries. This mixed, but visually predominant type, shows as a rule more outward signs of effort of attention. Many of the subjects started with a kinaesthetic verbal flow that was very inaccurate, but, after a few errors had been made, proceeded more cautiously, while the method of work becomes more visual in character, and the kinaesthetic verbal process became more conscious. *In other words, an attitude of greater caution, due to corrected errors, tended to change the process from one of range of consciousness to one of immediate recall.* There were several subjects who depended upon verbal flow so long as the numbers could be retained in the range of consciousness, but who depended upon visual imagery to reinstate the number if completely lost. Nearly all of the older subjects stated that they felt (were aware) they would be able to recall a number before they actually came to it, and that they knew beforehand when they had lost one of a series. In conclusion, it may be said that no subject used a

single type of imagery solely even for a portion of the test, and furthermore, no subject retained the same proportionate emphasis for any one kind of imagery or for a sustained throat sensation throughout the procedure. With some of the best subjects a kinaesthetic verbal flow (sustained sensation rather than imagery), and a keeping of the series well within the range of consciousness, characterizes the process. With the less successful, there was a halting report with constant effort to recall a portion or all of the series which had slipped from the range of consciousness.

4. The subjects who made the highest scores, age considered, are without exception of the type who learn readily, and possess great ability for easy concentration of attention. However, the reverse is not true; many who made but a mediocre score, comparatively speaking, gave evidence in other tests, school records, and social data, of ability to give continuous and concentrated attention. Tabulation C shows that those making the very highest scores in addition tended to make the highest scores in the Binet tests. The exceptions who made high scores and not as high Binet scores comparatively, give evidences from other tests and social data that the Binet score under-ranks them. The two most conspicuous cases are girls talented in music, XIII A and XIV G. All the subjects given in tabulation C tended to keep the addition series in the range of consciousness and also to show a predominance of kinaesthetic verbal flow. *The mental procedure in the performance* of the addition test probably accounts for the fact that these cases defy the general correlation tendency. In the case of XIII A, and also XIV G, two factors may account for the contrast between I. Q. and Addition score: (1) both subjects were spending between four and five hours a day in piano practice. This would tend to lower their academic attainments. An analysis of the Binet scores shows this to be true in the case of XIII A. (2) The other factor that possibly accounts in part for the contrast in scores is the training in successive attention-giving, the knack of fluent procedure, and the demand for a continuous and high degree of concentration neces-



sary for skillful piano-playing. Special attention should be given to the following.

XII F is a Russian Jewess. Binet score probably underestimates. English foreign to the home. Of the very brilliant, good-natured, superficial type. Learns rapidly. Prefers to learn rather than to think. Apparently puts forth little effort, but the results are far above average.

XIII A, a Russian Jewess. The most marked case of discrepancy between Binet estimate and the actual ability. A brilliant musical "prodigy." Academic training poor. Supernormal beyond question. Concentrates attention without effort.

XV E, D, and F. All three have exceptional ability at quick, apparently effortless concentration of attention. This is indicated in the performance in all tests, and also in the home data and school reports.

5. The superior group shows less decrease in both quantity and quality for the last 5-minute period of work than the average child for the same age. (There are, however, great irregularities within the superior group.) This superiority of the supernormals may be attributed to one or a combination of the following factors: (1) Less fatigue; (2) Difference in mental procedure; (3) Greater energy or vitality; (4) Greater endurance ("stick-to-it-iveness"), not from the standpoint of vitality (physiological), but from the standpoint of volition or intent; (5) Certain transfers of training, such as an habituated set for continuous and rapidly successive attention; (6) Docility, exaggerated reverence for school demands, an academic reputation to maintain, and exaggerated ideas (or at least knowledge) on the part of the subject of his superiority. The experimenter believes factors 2, 3, and 6 the most important. However, it is a matter of individual difference. It should be added that the factors here discussed are in evidence throughout the experiment and appear also in the sociological and school data.

Eight of the twelve (67%) making the highest scores in addition also show no decrease in efficiency the last 5-minute period. Of the remaining thirty-three cases of supernormals, but ten

SIMULTANEOUS ADDITION  
Comparison of highest addition scores in each age group with the I. Q.'s      Tabulation      C

Subject	I. Q.	Total No. Correct Additions	Remarks
VIII A-8	200	228	Far above others of the same age in both scores.
IX B-9-3	156.8	164	First in addition score. Second in I. Q.
X C-10-1	175.2	190	Far above others of the same age in both scores.
XI B-11-3	149.6	238	Far above in both cases (Only two subjects).
XII F-12-3	137.4	300	First in addition (Five subjects). Fourth in I. Q. See text and case descriptions.
XIII A-12-7	116.6	420	First in addition, last in I. Q. (Eight cases). See text and case description.
C-12-9	141.8	418	Second in both scores
XIV E-14-1	132	564	First in addition. Third in I. Q. (Nine cases). See case description.
G-14-4	129.6	501	Second in addition. Fifth in I. Q. See case description. Range of I. Q.'s cases 129-132.
XV E-15	130	684	Highest in both scores (Eight cases).
D-15	127.8	355	Third in addition. Second in I. Q.
F-15-5	126.5	383	Second in addition. Third in I. Q.



SIMULTANEOUS ADDITION Tabulation D  
 Super-normals showing equal or greater number of correct additions  
 the third 5-minute period

I	2	3	4	5
In Tabulation C	Subject	Increase in No. of Correct Addition, 3rd 5-minute period	I. Q.	Remarks
	VII F- 7- 2	2	160.5	Those marked "C" in the first column are also in the group given in Tabulation C.
	IX D- 9 -3	3	133	
C	X C- 9-10	1	175.2	
C	XI B-11- 3	2	149.6	
	XII E-12- 4	0	150	
C	F-12- 3	9	137.4	
C	XIII A-12- 7	15	116.6	
	B-12- 8	22	125	
C	C-12- 9	22	141.8	
	F-12-10	18	132.5	
	G-13- 3	39	132.7	
	XIV C-13-11	1	121	
C	I-14- 6	6	120.7	
	XV A-14- 9	1	122	
	B-14-10	0	121.9	
	C-14-11	5	124	
C	D-15	18	127.8	
	E-15	15	130	

(30%) show no decrease in efficiency the last period of addition. (Derived from tabulations C. and D. Tabulation D is compiled thus: the total number of correct additions is divided by three, giving the average number of correct additions per 5-minute period for the subject in question. A case is retained for tabulation D when the *total number of correct additions* in the last 5-minute period is equal to or greater than the average number of correct additions per 5-minute period.)

As tabulation C indicates a tendency for the highest in addition to rank highest also in I. Q., it would seem that those making the highest addition and I. Q. scores tend also to be the most efficient in the last 5-minute period.

Off-hand, the prominent factor here would seem to be fatigue. However, with the group given in tabulation C and several others of the supernormal group, there is abundance of evidence that the problem was actually less difficult rather than that resistance to fatigue was so pronounced. This, as stated in a previous

paragraph, is due to several factors, perhaps the most important being a different mental procedure. With others (and especially the children from whom the norms were derived), the test was labored from the first, consequently a greater degree of fatigue was possible. Also, in spite of precautions to keep the speed-accuracy situation constant in emphasis, there is no doubt that certain subjects placed greater emphasis on speed, others were cautious, and from temperament or habit, or both, placed emphasis on accuracy.

The test brings out individual difference in duration of attention, skill in even distribution of attention, and the ability to endure a monotonous procedure. These factors are, however, varied and need many qualifications in discussion. The supernormals show superior duration of attention and ability to withstand ennui.

Zeal and capacity. These have been mentioned before, but need special emphasis. A noticeable factor present in this test, especially, but noticeable in every test, was a certain *zeal* shown by all of the subjects (supernormals) almost without exception. Whether this is due to greater vitality or in part to an attitude of assurance, or to greater capacity, or all, it is difficult in certain cases to say. But there was an energetic attack and a persistence on the part of the superiors which is much above the average child; and their I. Q.'s are (roughly) correspondingly above.



## ASSOCIATION TESTS

*Description of the Experiment and Procedure.* Three association tests were given: Opposites, Part-Whole, and Genus-Species.<sup>1</sup> (Pyle's lists. The instructions in Whipple's "Manual of Mental and Physical Tests" were followed: Opposites, page 446; Part-Whole, 439; and Genus-Species, 433.) To Whipple's instructions were added the injunction, "Work as fast as you can, but try not to make mistakes." It should be noted also that Pyle had his subjects *write* the reactions, while the experimenter had the subjects give the responses orally. The latter is the procedure recommended by Woodworth and Wells, "Association Tests," Psychological Monographs, Vol. XIII, No. 6, pages 8-10.

*Aim of the Tests.* The tests, it is generally agreed, measure the quickness and accuracy with which relationships are established, and also the "determining tendency," that is, the ability to retain a certain problematic set throughout a series of reactions. The capacity to bring to the service of recall and to classify associations in some determined order is prominent in nearly all phases of intellectual work, orderly thinking, efficient learning, as well as clerical work. The prominence given to association tests in psychological experimentation seems, therefore, justified.

*Results.* The accompanying norms (from Pyle) are unfortunately the only ones obtainable. Comparison is handicapped on account of the fact that Pyle depended upon written response, while oral response seemed to the experimenter the only one justified if we desire to measure association rather than speed in writing combined with divided attention. With increased age

<sup>1</sup> Opposites Test: Good, Outside, Quick, Tall, Big, Loud, White, Light, Happy, False, Like, Rich, Sick, Glad, Thin, Empty, War, Many, Above, Friend.

Part-Whole Test: Window, Leaf, Pillow, Button, Nose, Smokestack, Cogwheel, Cover, Letter, Petal, Page, Cob, Axle, Lever, Blade, Sail, Coach, Cylinder, Beak, Stamen.

Genus-Species Test: Mountain, City, Weed, Metal, Furniture, Machine, Author, Planet, River, Book, Ocean, Fruit, Country, Animal, Bird, Food, Lake, Tool, Fish, Money.



writing becomes more automatic and rapid, and is probably less of a retarding factor; this is balanced somewhat by the fact that speed and accuracy in association increases more rapidly than speed in writing, and finally there comes a time when the speed in making associations surpasses any possible ability to write them down. The problem is still further complicated by the overlapping of the hand-motor, associative and the perceptive processes. It takes from 30 to 60 seconds to *write* (*i. e.* copy) the associations, depending somewhat on the length of the reaction words chosen, but more upon the hand-motor automatism which is largely a question of age and practice. With the superior children, the very rapid rate of association would have made the writing process an actual menace to speed; with the groups studied by Pyle (judging from the averages) this would not have been so. In any case, however, divided attention would tend at least to reduce speed of association. So much for theoretical considerations. The experimenter secured some 50 subjects, ranging from 8 to 18, and used both oral and written procedure, selecting as nearly comparable association lists as possible. The difference in the number of correct associations in 60 seconds was not nearly so great as the experimenter had anticipated, averaging about 2 associations more per 60 seconds when the procedure was oral. The written procedure gave slightly fewer errors.

In the accompanying tabulation, B, the average for the superior group surpasses the norms of Pyle for the same age. From 11 years on the superior group surpasses the normal group by about 5 years. The very large "A. D." in many cases indicates that Pyle had individual cases comparable to the superior group (tabulation A). The supernormals, age 12, show a very remarkable superiority, not only over the norms of Pyle (including adults) but over the superior group as well. The very marked advance of this group over all others came as a surprise to the experimenter and is perhaps best attributed to the vagaries of chance. With but one exception, XII C, all of the subjects are of the quick-response type, and this shows in other tests as

well. Even XII C is about average of the supernormals in this respect. In part, the high average score may be accounted for by the fact that no exception appeared to pull down the average; this can not be said of any other group. The following comparison of rank orders indicates a general superiority of the 12 year group even within the supernormal group.

## RANK-ORDERS. SUPERNORMALS. 12-YEAR GROUP

Subject	Chron. Age	Binet Score	Oppo- sites	Part Whole	Genus Species	Rank Order from Ave. Rank
A	23	42.5	42	47.5	52	42
B	24	42.5	50.5	44.5	46	46
C	25	23	29	29	26.5	20
D	26.5	37	53	34	34	35
F	26.5	25	48	19	29.5	31
E	28	42.5	49	52	50	43

Taken from Tabulation B, Correlations.

It is interesting to note the close correspondence in rank-order for the Binet Tests and for the Rank-Order derived from all the other tests given except the Binet series.

2. *Accuracy.* The accuracy was exceedingly high for nearly all of the subjects. On the whole, the subjects were inclined to acknowledge their inability to find a suitable association rather than to give an incorrect one, and *to make a decision and pass on to the next word.* Compared with an average group of children, the ability "to know when you know" and "to know when you do not know" is most marked. *This critical attitude toward the accuracy of one's own mental content, is, in the experimenter's opinion, the most important single feature in the test.* In the association tests, and in fact all of the tests, the critical attitude is more important as a criterion of intelligence than the actual information obtained. This becomes of greater significance in the tests that are informational or academic in character. In the score used for comparison, the number of correct associations in 60 seconds, the subject who quickly decided that he could not complete an association and passed on to the next made a much higher score than the subject who made an incorrect reply or



was slow in deciding to make none. In written procedure the loss of time might be very great when slow decision and wrong answer were combined with a very ponderous rate of handwriting. Such cases occur with sufficient frequency to bring the average far below the median. This condition, no doubt, accounts in part for the very great difference between Pyle's norms and the corresponding scores for the superior group.

3. *Speed.* Speed depends upon (1) degree of familiarity of the material; (2) quickness in making decisions in doubtful cases; (3) preserving the determining tendency; (4) innate associative speed (possibly). All three factors seem to play a part in the superior speed scores of the supernormals.

4. *Determining tendency.* Special emphasis should be laid upon the importance of the determining tendency, and the speed and accuracy secured through continuous anticipatory set of attention. This condition is prominent in efficient learning, organization of material, and classification. It seems especially pronounced in simultaneous addition, analogies, relative values, proverbs, and the present association tests under consideration. In the judgment of the experimenter, this continuous retention of a *problematic set* with clearness and intensity constitutes one of the chief differences between the performance of the average child and the members of the superior group. This difference, like nearly all individual differences, is a matter of *degree* rather than kind. Clearness of determining tendency is undoubtedly largely responsible for both speed and accuracy of association, also quickness in recognizing one's own inability to make an association.

5. *What the test measures.* The present association tests may be considered and interpreted in two distinct ways. (1) As mass tests in which comparison must be in terms of means or medians, and in which the introspections and the subjective attitude of the reagent are given scant or no attention. For rough measurements and trends the mass methods are desirable; provided they are properly treated mathematically, and that too great and sweeping inferences are not made, in applying to individual cases.



(2) The individual test, which is equivalent to the usual introspective experimentation of the psychological laboratory, seeks to unearth the subjective and objective factors, and above all, to discover if the objectively constant material remains constant in the subjective procedure of the individual or from individual to individual. This latter attitude must be the one emphasized in a study such as this. To the question, "What does the association test measure?" one must reply *in terms of the peculiar nature of the response of the subject in question*. The following classification of responses may be made, with the distinct understanding that no classification means the exclusion of other factors, nor that any individual will unvaryingly be motivated by the same set of factors. Roughly, the experimenter has considered the following suggestions of importance in interpreting the individual reaction.

(1) Subjects may, regardless of instructions, subjectively emphasize speed or accuracy; while characteristics in habits of doing, over-caution, nervous haste, general temperament, or similar factors, give undue prejudice. These are not matters either of intelligence or learning ability, and as actual experience has taught all of us, may disappear with practice. This is especially true with the over-sensitive, intelligent child. If *measured precision* characterizes the habitual mode of response, a reduction in speed is inevitable (XII H is a case in point).

(2) The degree of familiarity with the material is of great importance. Where the stimulus word itself is but vaguely defined in the subject's mind, the test becomes one of language ability rather than quickness in recall and sustained determining tendency. Such make a low score with many errors, usually. This, however, is not always true. Lack of familiarity with the association list may be accompanied with a high degree of accuracy, and awareness on the part of the subject that he does not know the stimulus word; or, if he does vaguely define the stimulus, he is unable to give the desired response. Such a subject may keep the determining tendency clearly in mind and make intelligent negative decisions. In a case of this kind the

intelligence must be judged by the nature of the responses rather than the score. The usual result, however, when the material is too difficult, is a low score with many errors. The attention is so engrossed in the difficulties of meaning that a less difficult material would be needed to allow the attention to be placed primarily on the selection of associations according to some classification.

(3) If the subject seems to secure about the right balance on speed and accuracy, and the material is sufficiently familiar, we may then ask if the determining tendency is kept clearly in mind, and whether there is a high degree of sustained attention. This will show itself in:

A. Accuracy at all times.

B. Dispatch in going to the next word if a stimulus word is not known.

C. Quickness in selection. (Subject to the temperament, habits, and general mental habits discussed under "I".)

"3" represents the test under the most favorable conditions, measuring what it is theoretically expected to: associative recall, determining tendency, and sustained attention. Where the subject possesses these in a high degree, intelligent adjustment, efficient learning, and vocational adaptability may be anticipated. A high score certainly favors a diagnosis of superiority.

(4) However, the reverse is not necessarily true; namely, that a low score and slow procedure (provided errors are few) mean lack of intelligence. There are subjects showing none of the symptoms mentioned under "I" (unless it be an apparent underemphasis of the speed instructions) who, nevertheless, proceed leisurely (or apparently so). Cases of extremely intelligent children with this characteristic may be cited, who seem to give a high degree of attention, retain the determining tendency (judging by freedom from errors, uniform rate of working, and the absence of hesitating or reversed decisions) and yet, if judged by mass norms, would be considered below average or distinctly mediocre. Yet the freedom from errors, their general habits of procedure, and the highly rational integration of their thinking



as revealed by cross-questioning, leave no doubt as to the intelligence of their replies. As intelligence diagnosis becomes more refined, we will probably think not only in terms of norms, but also in terms of individual interpretation. The type under consideration could be characterized as intelligent, but slow and phlegmatic.

(5) Theoretically, at least, the stimulus and response may be so familiar that the reply is more or less automatic; black-white, good-bad. On the whole, this seems to have been avoided in the lists used. The task (barring chance associations) never became so easy as to require less than a high degree of attention for success. In fact, when the material was relatively easier, there was an increase in speed and with this an apparent increase in intensity of attention and clearer demarcation of determining tendency.

(6) Correlations. In the intercorrelation of all the tests given in Tabulation C, Correlations, it will be noted that Association Tests Total occupies the fourth place in the hierarchy. In other words, it shows the highest general correlation tendency of any *single* test, except the vocabulary test. The correlations between the association tests are derived from Tabulation A, Correlations.

#### CORRELATIONS BETWEEN ASSOCIATION TESTS

	R.	P. E.
Correlation of Average with: Opposites .....	.912	.016
Part-Whole .....	.955	.009
Genus-Species .....	.867	.023
Correlation of Opposites with Part-Whole.....	.588	.061
Correlation of Opposites with Genus-Species.....	.598	.060
Correlation of Part-Whole with Genus-Species.....	.737	.042
Pearson's method.		

Woodworth and Wells found the following correlations for adults:

Correlation of Average with: Opposites.....	.88	.03
Part-Whole .....	.86	.04
(Subordinate) Genus-Species .....	.72	.07

It will be noted that the coefficients of the correlation for the supernormals range somewhat higher than for the adults. We may conclude from the very high correlations with the average



CORRECT ASSOCIATIONS WRITTEN IN 60 SECONDS (Pyle)\* Tabulation A

Age	Opposites						Part-Whole						Genus-Species					
	Male			Female			Male			Female			Male			Female		
	Cases	Aver.	A. D.	Cases	Aver.	A. D.	Cases	Aver.	A. D.	Cases	Aver.	A. D.	Cases	Aver.	A. D.	Cases	Aver.	A. D.
8	33	9.0	3.3	33	8.0	4.0	31	5.5	3.6	43	4.6	2.6	29	4.6	3.4	34	5.5	3.6
9	65	8.4	3.0	56	7.6	2.9	67	6.5	2.9	64	5.9	2.4	67	5.7	3.4	65	5.4	2.5
10	60	7.5	3.1	77	10.9	3.1	70	7.3	2.5	88	7.8	2.9	66	6.5	3.7	84	7.8	3.2
11	61	10.9	2.9	65	11.2	3.0	65	8.9	2.8	67	10.0	3.5	62	7.2	3.3	63	8.2	3.7
12	72	11.5	2.9	74	13.9	3.6	76	8.9	3.4	87	10.0	3.7	69	7.1	2.5	81	9.3	2.9
13	65	14.5	4.5	73	14.9	4.3	77	11.1	4.3	71	10.8	3.5	68	10.0	3.8	64	9.5	3.2
14	61	14.5	4.3	58	17.5	3.9	62	12.2	4.1	63	12.5	3.2	64	10.5	3.8	55	11.8	3.2
15	40	16.0	5.2	49	17.3	5.1	42	14.8	5.5	48	14.0	4.5	41	11.1	5.4	40	14.0	4.2
16	33	18.6	5.3	48	19.3	4.2	35	15.9	5.3	51	16.9	4.5	33	15.2	4.3	45	16.4	5.4
17	17	17.6	3.3	27	21.4	4.9	12	15.8	4.0	38	16.2	4.8	18	14.0	4.1	32	16.0	4.9
18	22	22.4	3.2	26	23.4	3.1	23	19.3	5.6	28	19.7	4.6	16	17.3	6.0	25	18.3	5.3
Adult	62	22.1	3.3	85	23.4	4.0	66	18.5	3.6	87	19.7	3.4	65	15.1	4.0	86	15.5	3.8

\*(Whipple, 448)

(Whipple, 444)

Taken from Whipple's "Manual of Mental and Physical Tests"

CORRECT ASSOCIATIONS WRITTEN IN 60 SECONDS. Tabulation B  
Comparison of Pyle's Scores with Supernormals

Age	Opposites		Part-Whole		Genus-Species		Totals Ave.	
	Pyle	Super-Normal	Pyle	Super-Normal	Pyle	Super-Normal	Pyle	Super-Normal
6		8		9		6		7.7
7		11.3		8.6		6.6		8.8
8	10.5	14.0	7.0	13.1	7.0	12.6	8.2	13.2
9	10.0	12.5	8.2	11.5	7.5	13.0	10.0	12.3
10	11.2	12.6	9.5	14.0	9.1	14.4	9.9	13.6
11	13.0	19.0	11.4	18.0	9.7	19.5	10.3	18.8
12	14.7	34.1	11.4	20.6	10.2	24.0	12.1	26.2
13	16.7	23.7	12.9	19.5	11.7	17.5	13.8	20.2
14	18.0	26.4	14.3	20.1	13.1	21.6	15.1	22.7
15	18.6	24.2	16.4	21.0	14.5	23.9	13.2	23.0
16	20.9	21.0	18.4		17.8		19.0	
17	21.5		18.0		17.0		18.8	
18	24.7		21.5		19.8		22.0	
Adult	24.7		21.1		17.3		21.1	

NOTE: Pyle's report for boys and girls is combined in one, and 2 is added in the hope of making the results more comparable to the reports from the superior group. The Tabulation is derived from Tabulation A and Tabulation A, Correlation.

that any one of the association tests is fairly indicative of the associative control demanded in this type of test. It seems safe, also to infer that the mental processes involved and the mental task in general remained nearly constant for all three tests. And while there are individual exceptions (see case descriptions) the correlations testify to the excellence of the association lists. It will be noted that the Part-Whole and the Genus-Species are more closely correlated than either is with the Opposites Test.

## BINET LETTER SQUARES

*Description of the Experiment.* The material/method of giving, and also the method of scoring, are taken from Whipple's "Manual of Mental and Psysical Tests," Vol. II, page 162 ff. The averages are for the 10 exposure crads. Introspections, the order of reporting the letters, and any symptoms of learning or reporting were carefully noted.

*Results.* 1. Comparison with norms. In tabulation A, the experimenter has placed the results from the superior children with those secured by Anderson. (The results for the superior children are derived from Tabulation II, Appendix.) It will be noted that the mean for the superiors is in every case decidedly greater than the corresponding mean for the same age from Anderson's cases. The superior children (considered in averages) are from two to five years in advance of Anderson's cases. The difference becomes more marked the older the children. With the exception of Age 10, the minimum score for the superiors equals or surpasses the mean score for Anderson's group. A comparison of the minimum and maximum scores of the superiors with the norms indicates clearly that subjects selected for superior ability (in a general way), have been selected as regards ability in mechanical memory (in so far as the letter-square test is indicative). With but two exceptions (ages 8 and 9), the maximum score in the superior group surpasses the maximum score for the norms, while the minimum score of the superiors, as just indicated, is not only far above the minimum for the norms, but far above the mean for the norms. In other words, the general superiority of the supernormals may be stated in two ways: (1) none of the superiors make low scores in the letter-square test; (2) there is a maximum superiority in the supernormal group. To get the full import of the contrast between the two groups, it must be recalled that the criteria for the selection of the superior group were based upon memory tests only in so far as they are incorporated in the Binet



Tests. Thus, without any attempt to select for memory ability, indirectly such a selection has taken place. This is brought out still more forcibly if one bear in mind the much larger number of cases dealt with in Anderson's scores; for example, at 12 years, Anderson has 139 cases with a maximum score of 272, against 6 cases of superiors with a maximum score of 344.

2. Tabulation C, Correlations, shows that the Binet Letter-Square ranks seventh in the hierarchy of correlations, with an average tendency of correlation of .593.

3. Analysis of procedure. The assumption in the test is that the learning will be mechanical in nature, and that the subject will not endeavor to establish associative connections between the letters. In practice, however, this does not remain true.

(1) Many, especially the younger children, "just saw or heard or said the letters;" often it seemed to be in the nature of a *passive imprinting*. In general, such subjects gave other evidences of quick perception and vivid and tenacious imagery.

(2) In some cases there was a need to write the letters with great haste immediately after the exposure. It was impossible to get satisfactory introspections, but there was evidence of a short period of very intense and vivid imagery immediately following the exposure. This was noted in the cases of visual imagery. Perhaps we have here the memory after-image.

(3) One of the most common methods of retaining the letters for immediate reproduction was by repetition during the exposure and until written down. In this case the process of retention did not seem to be one of immediate recall but one of retaining or continuing the letters by throat sensation. Where this is true the test is measuring kinaesthetic verbal span.

(4) When either procedure (2) or (3) dominated the mental process, the subject wrote rapidly, and whatever was put down by these procedures was done at once or not at all, without the impress of the letters ever leaving the consciousness. In some cases, and with certain letters, the impress at the time of exposure left consciousness and was recalled by imagery, either visual or kinaesthetic, or a combination of both. It was not pos-

sible to determine from the introspections the amount of auditory imagery present. There was considerable individual difference as regards the length of time in which the letters could be recalled by imagery. Some put down within a few seconds after the exposure all the letters they could recall, and there was no appearance of belated letters in their imagery. With others throat or visual imagery would supply single letters or groups of letters for some time after the exposure had been removed. Often these letters were not recalled in the serial order in which they were arranged on the exposure card, but appeared independently, one here, one there, in a more or less detached manner. In many cases the subject could not tell how the letter came to mind. Visual imagery was more easily recognized than kinaesthetic verbal or auditory.

In so far as the subject depended upon imagery and immediate memory (detached), we are probably dealing with native memory ability.

(5) In many cases, especially with older children, all sorts of mnemonic devices, rhythms, and associative cues appeared. Some times these associations were spontaneous in character, and sometimes they were the result of remarkable ingenuity and resourcefulness in the use of immediate memory devices. Subjects making use of associative combinations to retain the letters also make use of the procedures described in (1), (2), (3), and (4), and the possibilities of combination are without end. Associative devices appeared as a part of the mental procedure in the majority of the high scores.

We have here, then, two distinct types of procedure: First, (1), (2), (3), and (4), which probably indicate native memory capacity; and the second, procedure (5), associative ingenuity and tricks in learning. The latter is presumably largely a matter of acquirement, based upon native alertness, resourcefulness, training and habits of work, and a high degree of attention. Such factors are conceivably important in efficient learning, intelligence, and vocational adaptability.

As noted before, the Binet Letter-Square test correlates very



highly with the Binet Tests and with other tests reputed to measure intelligence. The two most obvious explanations are: (1) that native memory ability is an advantage in situations of an academic and informational nature; and (2) that where a high score is due to associative resourcefulness, we have involved ingenuous ability to form new associations. Ability to make new associative groupings is usually considered a mark of intelligence.

(6) Finally, in the general classification offered here, there is no implication that any subject will conform to a particular procedure throughout the test. And should he show a very marked preference for a certain procedure for retention, there is no intention to imply that another procedure would not be used with a repetition of the test or that another procedure could not be instituted.

BINET LETTER SQUARES

Tabulation A

Anderson's Norms					Superior Children			
Age	Cases	Mean	Min.	Max.	Cases	Aver. No. Letters	Min.	Max.
6					1	99		
7					7	111.7	68	145
8	52	108.2	47	198	3	141	108	191
9	92	109.7	36	182	4	164.6	141	181
10	115	127.7	35	213	5	178.2	107	236
11	126	139.8	60	264	2	250.5	217	284
12	139	157.8	76	272	6	248.7	188	344
13	125	156.9	52	298	8	258.1	199	333
14	96	165.6	74	283	9	265.5	214	340
15	58	170.8	67	323	8	251.6	203	340
16	25	181.6	104	318				

Anderson's Norms are taken from Whipple, page 173, Vol. II. The score for ten trials.

## SUBSTITUTION TEST. SYMBOL-DIGIT

*Description of the Experiment.* The material for the experiment, with the general instructions, is taken from Whipple's "Manual of Mental and Physical Tests," Vol. II, pages 133 ff. The specific instructions are given in section A, page 134.

*Method of Procedure.* The procedure was somewhat modified from that given by Whipple. The blanks as arranged, have 200 symbols on each. Two sheets were used. With sheet I, the key-card was allowed. At the close of section I (half of sheet I) a halt was called and time noted. The subject was then asked to write the symbols, corresponding to the nine digits, from memory. Section II (the remainder of sheet I) was then filled, scoring time. If the subject did not make a perfect recall at the close of section I, he was again asked to write the symbols corresponding to the digits. It was seldom that mistakes occurred in the second attempt at recall, but where they did it was brought to the attention of the subject. It should be emphasized especially, that while the subject was allowed to use the key-card throughout sheet I, it was made very clear that if he found it more advantageous he was at liberty to fill the blanks from memory. In actual practice, the key-card was usually gradually discarded, reference to it being infrequent the latter part of section II. Sheet I will be referred to as the Substitution Sheet, and Sheet III (a repetition of Sheet I without the use of the key-card) as the Recall Sheet. Time was noted at the bottom of section III (first half of Sheet II) and at the close of the test (section IV). Sheet II was filled without a pause. The number of correct substitutions for each section is given in percent. As there are 100 substitutions in each section, each error means a penalizing of 1%.

*Results.* In order to make comparison, it was necessary to establish norms with a group of non-selected children. This is presented in tabulation A. Tabulation II, Appendix, contains the individual scores for the superior children.



1. As regards time. The time for section I is really, with but few exceptions, a matter of quickness in locating the symbols on the key-card and placing them on the blank. Quick perception, dexterity with pencil, sustained attention, and ability to work with groups of two or three or even a line of symbols at a time (five) are probably the most important factors at the beginning. Then there is the possibility of an active, or a passive process of work. With some subjects the matter is one of copying, with little or no cross-comparison of the symbols. With others the process is an active one: <equals 4 and> equals 6 and so on. The older subjects tended as a whole to form associations and make contrasts and comparisons. The younger children, and those who relied on visual imagery tended to hold each symbol-digit as an independent unit. However, individual variations were capricious, and the method of work with the same individual was not consistent throughout. With but few exceptions the superiors surpassed the average of the non-selected group in the time score for Section I. The difference is less marked with the older subjects. Roughly, the superiors for each age compare with the non-selected group one year older.

Time for section II. The mental processes involved in section II are more varied than in section I for the reason that some of the subjects were still referring to the key-card throughout, some partially and some little or none. Consequently the process varied from one of perception, through all stages of perception-recall, to one where the key-card was discarded and we have voluntary reference to recall rather than to perception. On the whole, those who were able to discard the key-card made the best time. The superiors surpassed the normal group to about the same degree they did in section I.

Time scores for sections III and IV. Throughout, the supernormal group show about the same superiority in the time scores for sections III and IV as they did in sections I and II. The correlation (Pearson method) for the combination of sections I and II with sections III and IV (combined) is .862, with a probable error of .025. This indicates that the subjects tended

to maintain a certain time-rank throughout sections I, II, III, and IV. On the whole, the scores for sections III and IV are about the same. Sometimes III and sometimes IV is longer. With the younger children especially there is more of a tendency to increase the time score on section IV. Fatigue probably is responsible here, and with the very little children there is evidence of fatigue of the hand.

2. As regards accuracy. In filling the blanks for all of the sections (I, II, III and IV) the superior group make so few errors that with but few exceptions we may consider the time score as indicative of the procedure. The same statement may be made for the non-selected group. In this group there were a few who made a great many errors and thus pulled down the average accuracy, but an accuracy score of from 93% to 97% is not secured without a large number of perfect or nearly perfect scores.

It will be remembered that the subject was asked to report the key-card from memory after filling section I, and again after section II if he did not succeed after the first section. The second trial was only necessary in 7 of the 53 cases of superiors; 5 of the cases were below the age of nine. Also, with the non-selected group, a very great majority of the subjects reproduced the key-card correctly after the first trial (Tabulation A). The eight-year supernormal group is slightly superior to the nine-year non-selected group in accuracy of key-card recall.

3. Methods of work. It is possible to assemble some of the chief devices used by the superior subjects.

Section I. In section I quickness of perception and the ability, or at least the device, of filling more than one blank with a single reference to the key-card account, it would seem, in part, for the initial speed. One other factor that is hard to describe is an active rather than a passive attention to the key-card while using, with an awareness of the relative position of the numbers of the key-card. Off-hand this seems trivial, but something in the nature of such an awareness is the only explanation for two different types of procedure in filling the blanks in section I.



Especially with the superiors, and more especially with the older superiors, 3, 7, 5, or 9, for example, was found with a precision of eye and of pointing finger (in certain cases) quite in contrast with other subjects, especially in the non-selected group, with whom a *search was instituted* to find the symbol-digit on the key-card. This precision in grasping relative positions on the key-card is particularly marked with some of the best subjects. It probably is indicative of a high degree of attention. This leads to another factor related to attention, and that is an active rather than a passive attitude towards the content of the key-card while filling the blanks. With some of the subjects the first line is hardly filled until 6 and 4, and 3 and 9 are, respectively, grouped as contrasts; and an active process of forming unique cues, mnemonics, and associations takes place at a time when there is no demand for more than *passive perception*, as the subject is not acquainted with the fact that recall will be requested. In contrast to this active associative process while using the key-card, there were others who became quickly familiar with the key-card directly through imagery, while mnemonics and associative groupings were relatively few.

Key-card recall at the end of section I. Considerable individual difference was shown in the recall of the key-card. On the whole, the method of recall was a continuation of the procedure that had already made its appearance in the process of filling the blanks in section I; *i. e.*, associative groupings, mnemonics, and imagery (especially visual). With some of the subjects but scant associative cues or imagery was present. 5 was / ; 1 was  $\square$  ; 4 was < ; and so on. Here we have the associative devices or the imagery quickly reduced to the merest scheme, or even eliminated.

Section II. In section II the mental process in filling the blanks is a rapidly changing one. The majority used the key-card at the beginning, and the majority had discarded the key-card by the time they were approaching the end of the section. The quickness with which the key-card is voluntarily discarded would seem to be of importance in estimating ease and spontaneity of immediate recall, which is conceivably of value in

to maintain a certain time-rank throughout sections I, II, III, and IV. On the whole, the scores for sections III and IV are about the same. Sometimes III and sometimes IV is longer. With the younger children especially there is more of a tendency to increase the time score on section IV. Fatigue probably is responsible here, and with the very little children there is evidence of fatigue of the hand.

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Tabulation A

## SUBSTITUTION TEST—NORMS

Age	No. of Subjects	Time				Accuracy				Key-Card Recall		Remarks
		I	II	III	IV	I	II	III	IV	I % Accuracy	II % Accuracy	
9	30	10:26	7:39	8:20	7:49	92	93	84	87	72	91	53% get first recall
10	46	6:27	5:02	5:17	5:59	93	97	88	89	89	95	73% get first recall
11	26	6:54	5:13	5:56	4:19	94	96	91	94	90	95	75% get first recall
12	50	6:31	5:01	4:18	4:09	95	96	96	95	92	98	81% get first recall
13	41	6:15	4:56	4:13	3:58	96	98	97	97	95	*	85% get first recall
14	54	4:35	3:23	3:28	3:19	97	97	97	96	96		**
15	28	4:05	3:16	3:18	3:14	96	96	97	96	96		***
16	37	4:04	3:02	3:01	2:59	97	97	96	98	97		
A												

\*85% get correct first recall or errors are so slight as to be corrected upon reference to key-card.

10% have ceased to refer to key-card during filing of first sheet.

\*\*All but one get complete score or correct error upon reference to key-card after first time. He below normal.

\*\*\*All but two recall or know error upon reference to key-card. One (below normal) fails after second recall.



learning and in certain vocational situations. Any conspicuous behavior here must needs be left for the case descriptions.

Sections III and IV. As the key-card is not permitted, the subject is compelled to depend upon recall in filling the blanks. Some depended upon visual imagery, and in cases, went so far as to have the symbol-digits placed upon a key-card, all in imagery, of course. Others depended upon associative devices as they did in the key-card recall. All of these subjects, though, retained some of the symbol-digits by a more direct association in which the imagery was suppressed or less prominent. This automatic sort of recall became more pronounced the more blanks filled. The ease with which the recall process slips over from associative devices and vivid imagery to a process that perhaps might be described as temporary habit formation is of importance in learning and in many vocational adjustments.

4. Comparison of supernormals with the norms from the non-selected group. Tabulation A and Tabulation II, Appendix. Throughout sections I, II, III, and IV, the time scores of the superior groups are about on a par with the time scores of the non-selected group *three to four years older*. The accuracy scores for both groups (norm and supernormal) is so high that there is little contrast; however, the supernormal groups show a tendency to superiority. In the key-card recall the superiors made the better scores, and, speaking in percentages, fewer required a second recall to obtain a perfect score.

5. Correlations. In the hierarchy of correlations (Tabulation C, correlations) Substitution Sheet I stands fifth, showing an average tendency of correlation of .616, and correlating with the Binet Test .85. The Recall Sheet stands ninth in rank in the hierarchy, with a general tendency of correlation of .575, and a correlation with the Binet Test of .72. Assuming that the correlation with the Binet Tests and the rank in the hierarchy are indicative of the value of the test in measuring relative ability, we may say that the substitution is of greater value than the recall as a test. It has been often noted that practice tends to eliminate individual difference, and this may account for the registering of less individual difference in the Recall Sheet.

## DIRECTIONS TEST

*Description of the Experiment.* The test is taken directly from Woodworth and Wells "Association Tests" (Psychological Monographs, Vol. XIII, No. 5, page 68). The tests are labeled A, B, and C, which indicate the order in which they were given and also offer an easy means of reference:

(Test A begins, "Cross out the *g* in tiger.")

(Test B begins, "Cross out the smallest dot.")

(Test C begins, "With your pencil make a dot over, etc.")

*Method of procedure.* The procedure is simple: with the use of a half dozen illustrations it can be made clear to the subject that he is to do exactly and quickly what the test demands. Time was not kept for each statement, but only for the whole test. However, a peculiarly long time for any single direction statement was scored and introspective data secured if possible.

*Results.* 1. Comparison of superiors with norms. It was necessary in the directions tests to establish norms. All testing was by the individual method. The inability of many children under eight to read the tests, at least readily, made it impossible to secure norms below that age, although it is common enough, of course, to find children able to do tests A and B. Test C is too difficult for many children below eight years, both from the standpoint of reading and the complexity of the instructions. At least for children up to eleven (in the normal group) it is common enough to find cases in which *slow rate of reading* rather than *rate of association in following directions* is the thing tested. From about fourteen years on (and in many cases earlier) tests A and B are perhaps just a little too easy to require the maximum of effort and attention. However, there is ample room for intensity of attention and alertness to express itself in increase in speed. The increase in time for test C, over Tests A and B, is proof that speed is an associative rather than a reading difficulty. The actual reading time for A, B, and C is as follows: A, 19 sec.; B, 18 sec.; and C, 31 sec. This is the



time required by a rapid adult reader, of course, without any attempt to perform. The actual reading time for tests A and B should bear the relation of about 3:5, test A containing 152 words and B test 259 words.

Tabulation A may be compared directly with tabulation III, Appendix. These tabulations permit a direct comparison of the time and also the accuracy scores for each of the superior group with the time, median, and mean in the norm group. In tabulation B, the superior group is compared by ages with the norm group. The score is reduced to time, and errors are arbitrarily penalized thus:

$$\frac{20T}{20-E} \text{ equals time to perform test (penalized for errors)}$$

20 equals the number of direction in each test

T equals time in seconds

E equals errors

The time scores for tabulations A and B are corrected in this manner, and also Directions Test C, Tabulation A, correlations. The penalizing is probably just a little too severe, and gives an exaggerated comparison between the norm and the superior group. However, the errors may be ignored, which is a distinct advantage to the norm group. In this case, direct comparison may be made between the individual cases in the superior group (tabulation III, Appendix) with either the median or the mean of the norm group, tabulation A. Such a comparison shows a decided superiority on the part of the supernormal group. Especially up to and through the age of twelve years, the superior group is from two to four years ahead of the norm group. Beyond this age the contrast is not so marked, but still it is only in rare cases that the members of the superior group make scores as low or lower than the mean or the median of the norm group.

Errors. By reference to tabulation A and tabulation III, Appendix, it will be seen that the superior group made far fewer errors than the average throughout. However, there are several cases in the superior group where the error score is greater than the average error for the norm group for the same age. It should

be added that the non-selected (norm) group naturally contained subjects who made very large error scores due to the inability to read at all fluently. (Space does not permit the detailing of the individual scores for the non-selected group similar to tabulation III, Appendix, for the superiors.) It seems to the experimenter, after a careful survey of the norm-group data, that ability to read fluently is a prominent factor in both time and the error scores. With but few exceptions, from 11 years on, the *following of directions* is more likely the determining factor in speed and accuracy. There are, however, undoubtedly cases through the entire norm group where considerable attention is devoted to the sheer mechanics of reading. The superior group time score is less, throughout, than the corresponding norm scores (as noted in the previous paragraph). Tabulation E gives a comparison of the accuracy scores for the norm and the superior groups; tabulation D, a comparison of the time scores.

Correlations. The positive correlations between the Directions Tests (Pearson's method) is as follows:

	r.	P. E.
A with B .....	.767	.038
A with C .....	.622	.058
B with C .....	.734	.043

The correlations would seem to signify that the tests are closely alike in the ability required: Test A and Test B being most nearly alike. Tests A and C are less highly correlated than B and C, probably due to a more uniform procedure in A and B, resulting from the practice, and especially certain superficial sets or adaptations secured while performing A. The correlations are derived from tabulation C.

In the hierarchy of the correlations, the Directions Test ranks sixth, having an average positive correlation of .60, and a correlation with the Binet Tests of .73.



DIRECTIONS TEST Tabulation A  
Norm (non-selected group)

Age	No. of Cases	A			B			C		
		Arith. Mean of Time	Median of Time	Av. No. Errors	Arith. Mean of Time	Median of Time	Av. No. Errors	Arith. Mean of Time	Median of Time	Av. No. Errors
7										
8	40	5:24	4:52	4.2	5:05	4:50	2.9	7:24	6:25	4.1
9	41	4:32	3:40	2.9	4:44	4:22	2.8	6:07	5:42	3.4
10	40	3:51	3:40	2.8	3:04	2:54	1.9	5:01	5:03	3.8
11	50	3:01	3:02	2.3	3:06	3:15	1.6	4:22	4:15	3.9
12	50	3:06	3:00	1.9	2:36	2:25	1.4	4:12	4:02	2.9
13	51	2:48	2:41	1.4	2:29	2:32	1.5	3:57	3:66	2.6
14	25	2:50	2:35	1.7	1:58	1:54	.9	3:51	3:57	1.9
15	30	2:17	2:18	.8	1:54	1:30	.8	3:50	3:47	1.4
16	32	2:07	2:18	.8	1:38	1:32	.6	3:18	3:08	1.5

This tabulation may be compared directly with Tabulation III, Appendix.

DIRECTIONS TEST Tabulation B

Comparison of Time Scores (Arith. M. corrected for errors) of Norm Group. Time in Seconds.

Norm Superior

Age	Norm			Superior		
	A Corrected Time Score	B Corrected Time Score	C Corrected Time Score	A Corrected Time Score	B Corrected Time Score	C Corrected Time Score
6				183	203	326
7				257	245	413
8	410	357	558	141	154	238
9	318	330	442	154	228	307
10	268	202	372	155	148	202
11	204	202	325	101	121	118
12	203	168	295	79	79	149
13	185	161	276	94	89	140
14	186	128	255	95	92	157
15	143	119	247	93	85	165
16	132	101	214			

DIRECTIONS TEST Tabulation C  
 Super-group Time Scores for Tests A, B, and C  
 (Corrected for Errors)  
 Time in Seconds

Subject	A Test	B Test	C Test	Subject	A Test	B Test	C Test
VI A- 6- 5	183	203	326	XIV A-13-10	.77	75	145
VII A- 6- 8	217	248	436	B-13-11	81	92	134
B- 6- 9	331	232	...	C-13-11	129	131	190
C- 7	215	310	323	D-14	123	102	142
D- 7- 2	241	216	...	E-14- 1	91	77	154
E- 7- 2	274	250	415	F-14- 3	65	70	109
F- 7- 2	336	276	400	G-14- 4	85	91	142
G- 7- 3	198	181	488	H-14- 4	135	120	283
VII A- 8	85	79	171	I -14- 6	70	72	115
B- 8- 2	154	168	291	XV A-14- 9	98	102	160
C- 8- 6	186	216	251	B-14-10	117	102	207
IX A- 8-11	149	207	522	C-14-11	96	89	153
B- 9- 3	143	433	428	D-15	75	66	209
C- 9- 4	127	118	155	E-15	54	56	88
D- 9- 3	197	155	224	F-15- 5	94	72	120
X A- 9-10	134	129	186	G-15- 6	91	97	144
B-10- 1	181	139	174	H-15- 1	122	97	236
C-10- 1	130	124	204				
D-10- 2	143	194	185				
E- 9-10	186	156	263				
XI A-11- 3	101	109	165				
B-11- 3	100	133	91				
XII A-11- 9	66	94	149				
B-12- 1	97	87	149				
C-12- 2	75	80	177				
D-12- 3	66	59	104				
E-12- 4	80	65	139				
F-12- 3	87	88	176				
XIII A-12- 7	147	127	210				
B-12- 8	80	88	138				
C-12- 9	111	105	119				
D-13	94	82	155				
E-13- 6	67	75	123				
F-12-10	96	102	136				
G-13- 3	63	64	100				
H-13- 6	92	72	138				



COMPARISON OF TIME SCORE Tabulation D

Directions Tests  
Norm

Superior

Age	Arith. Mean			Test A Median Time	Test B Median Time	Test C Median Time	Test A Av. Time	Test B Av. Time	Test C Av. Time
	Test A Av. Time	Test B Av. Time	Test C Av. Time						
6							2:45	2:53	4:37
7							3:53	3:50	7:48
8	5:24	5:05	7:24	4:52	4:50	6:25	2:17	2:23	3:49
9	4:32	4:44	6:07	3:40	4:22	5:42	2:27	2:45	4:37
10	3:51	3:04	5:01	3:40	2:54	5:03	2:29	2:20	3:11
11	3:01	3:06	4:22	3:02	3:15	4:15	1:35	1:55	2:00
12	3:06	2:36	4:12	3:00	2:25	4:02	1:17	1:16	2:19
13	2:48	2:29	3:57	2:41	2:32	3:66	1:31	1:27	2:07
14	2:50	1:58	3:51	2:35	1:54	3:57	1:39	1:30	2:32
15	2:17	1:58	3:50	2:18	1:30	3:47	1:33	1:25	2:32
16	2:07	1:38	3:18	2:18	1:32	3:08			

COMPARISON OF ACCURACY SCORE Tabulation E

Directions Test

Norm

Superiors

Age	Test A Av. No. Errors	Test B Av. No. Errors	Test C Av. No. Errors	Test A Av. No. Errors	Test B Av. No. Errors	Test C Av. No. Errors
6				2	3	3
7				1.7	1.3	1.6
8	4.2	2.9	4.1	.3	1.3	1
9	2.9	2.8	3.4	1	3	2.5
10	2.8	1.9	3.8	1	1	1.2
11	2.3	1.6	3.9	1	1	1
12	1.9	1.4	2.9	3	.66	1.3
13	1.4	1.5	2.6	.25	.6	1.5
14	1.7	.9	1.9	.2	.3	.7
15	.8	.8	1.4	.12	0	1.25
16	.8	.6	1.5			

## TRABUE COMPLETION TEST

### Tests B and C

*Description and Procedure.* Tests are taken from M. R. Trabue's "Completion-Test Language Scales." Trabue's directions and method of scoring have been followed exactly. The tests were originally given as mass tests, consequently it has been necessary to approximate the norm scores for each age from the grade scores given on page 118. (See tabulation A.)

*Results.* Tabulation A contains the norms for Completion-Test B and C, along with the scores for the superior group. (Compiled from tabulation III, Appendix.) Trabue's scores are from mass tests and are arranged by grade. For purposes of comparison, it has been assumed that a second grade child is seven years old; a third grade child, eight years old, and so on. However, counting those who start to school late and those who repeat, the number below grade is greater than the number who "skip" grades. This condition usually becomes more marked in the upper grades; so that it is perhaps safe to add at least a year to the average age from the seventh grade up; thus, the mean age of the seventh grade child would then be thirteen years, and so on. This means that as the tabulation stands it favors the norm group at the expense of the superior group.

1. Through age 12, the superiors run far beyond Trabue's medians for the same age (approximate from grade norms). Ages 13 and 14 are but slightly superior to the norm group; age 15, superior group, about on a par with the norm group.

2. In the superior group, ages 11, 12, 13, 14, and 15 are about equal in performance, which means that the 11 and 12 year groups are really superior to the older groups when age is considered. Both ages 11 and 12 surpass age 13. The superiority of the 12 year group has been noted in several tests.

2. The scores of the superior group just making or falling below Trabue's medians are given in tabulation B. With the



scores have been tabulated each subject's rank-order in such tests as would seem to have some relation to linguistic fluency. In the first place, it should be noted that none of the superior group fall very far below the Trabue norm. In the second place, all of the rank orders of the tests related to linguistic ability should be compared with the rank-orders for the combined Trabue scores and also with the rank-order for chronological age. Taking the rank-order for chronological age as the norm, we may make the following generalizations:

Of the 13 cases,

- 11 are lower in vocabulary than in chron. age rank
- 8 are lower in analogies than in chron. age rank
- 10 are lower in total association than in chron. age rank
- 9 are lower in directions total than in chron. age rank
- 10 are lower in marble statue than in chron. age rank
- 12 are lower in proverbs (accuracy total) than in chron. age rank
- 13 are lower in Trabue (combined score) than in chron. age rank
- 13 are lower in rank-order average than in chron. age rank.

It is perhaps safe to interpret this as a general linguistic deficiency. The most pronounced deficiencies in both vocabulary and in the Trabue test are in cases XIII A, XIV C and XV C and H. Reference to column 15 indicates that in the first three cases (Russian Jews) the conditions are not conducive to the speaking of good English. The last case, XV H, is one in which the home life is poor in almost every respect. It should also be noted that in four of the cases piano practice dominates interest, and in three of these cases (Russian Jews) the English at home is poor and part of the time a foreign tongue is heard. (Tabulation B is compiled from tabulation A; tabulation III, Appendix; tabulation B, Correlations; tabulation A, Case Descriptions.)

A comparison of column 12 and column 14 does not indicate that for this group grade had any particular bearing on Trabue scores.

4. High scores. The conspicuously high scores have been brought together in Tabulation C in order to carefully consider any possible trends, or relations to such factors as home, culture, other tests of linguistic ability, fluent reading, grade in school, general social milieu, etc.

As regards home life, there is not a single case where the home conditions are not above average; and parents and child are all serious minded (with the possible exception of one or two subjects. In every case the child is a "reader," and in most cases has learned to read at home at a very early age. With but one or two exceptions, there is unusual verbal fluency in speaking. It must be recalled, however, that much of the same thing could be said of many of the superior subjects not making conspicuously high scores. A case in point is VIII A.

Comparing the rank-orders with the chronological age rank-order, we get the following:

Of the 17 cases

- 13 are higher in Binet age than chron. age
- 12 are higher in Vocabulary than chron. age
- 9 are higher in Analogies Total than chron. age
- 12 are higher in Total Associations than chron. age
- 13 are higher in Directions C than chron. age
- 11 are higher in Marble Statue than chron. age
- 10 are higher in Proverbs than chron. age
- 17 are higher in Trabue than chron. age.
- 14 are higher in Rank Order average than chron. age.

These comparisons show a decided trend to superiority in general and in tests related to linguistic ability in subjects making a high score in the Trabue tests. The general trend is in decided contrast to the situation in tabulation B, discussed under the previous caption "3."

However, the superiority is more marked in relation to the Trabue tests than to any other. Out of the 17 cases, the following rank-orders are as high as, or higher than, the Trabue rank-order:

- 0 of the chron. age rank-orders
- 2 of the Binet rank-orders
- 4 of the Vocabulary rank-orders
- 2 of the Analogies Total rank-orders
- 3 of the Directions C rank-orders
- 5 of the Marble Statue rank orders
- 2 of the Proverbs rank-orders
- 0 of the Rank-Order average.

This comparison of rank-orders along with the preceding one indicates that the selection for superiority in the Trabue tests does



not signify an equivalent superiority in the allied linguistic and associative tests.

Superior scores in the Trabue tests seem to bear little relation to school grade. This, however, does not mean that training is not a factor. The very great contrast between the Trabue medians and the scores of the younger subjects is accounted for largely (probably) by the fact that almost without exception the superior subjects learned to read at home at a very early age and were reading fluently and much at the time most children are mastering the primer.

5. Correlations. The Trabue tests combined score has an average positive correlation of .527, and a correlation with the Binet tests of .72. (Correlations, Tabulation C.) It is usually assumed that this test is highly correlated with all forms of linguistic ability.

The following correlations are of interest:

	r.
Trabue and Vocabulary .....	.64
Total Association .....	.60
Directions test .....	.52
Analogies B .....	.59
Analogies total .....	.53
Proverbs .....	.61
Marble Statue .....	.18

And again, the correlation of the Trabue Completion Test with tests less dependent upon language:

	r.
Trabue and Substitution test .....	.54
Binet Letter-Square .....	.57
Substitution (recall) .....	.56
Relative Values .....	.38
Simultaneous Addition .....	.23
Rank-Order average .....	.70

The first group of correlations suggests that there is a very close relation between the Trabue test and the whole group of tests dealing with language; while the second group suggests that the Trabue test correlates high with a majority of the tests in general. In other words, a large number of social, learning, and native factors are probably involved.

A comparison of the correlations of the completion test with intelligence and grades (in school) indicates, as far as this group is concerned, that intelligence (Binet tests) correlates more closely than grade standing. Pearson's method gives the following positive correlations:

	r.	P. E.
Trabue test B with grade .....	.407	.078
Trabue test C with grade.....	.552	.065
Trabue combined with Binet tests .....	.720	.045

The positive correlation between Trabue Test B and Trabue test C is .547, with a P. E. of .066. (Pearson's method.) While this is a fairly high correlation and indicates that the tests probably are much alike in difficulty, it should be noted that the correlation is less than that of the Trabue combined score with the Vocabulary test or with the total Associations.

6. Introspections. Introspections show little evidence that (consciously, at least) grammar plays any part in the decisions or in the selections of words. There are, however, a few specific exceptions. Getting the wrong idea of "how the sentence is going to come out" constitutes one of the chief difficulties in filling the blanks. Time was often increased, in the case of older or more discriminating reagents, through an attempt to improve the style, to avoid awkward expressions and alliterations, to seek elegant expressions, etc. Age probably plays the most important part here, the older subjects being more critical. Subjective set, either for speed or accuracy, along with temperamental makeup of haste or leisurely attitude, play a part. An overly conscientious and painstaking or nervous attitude caused some of the subjects to make "hard work" of the test.

The nature of the difficulty for any particular sentence is largely a matter of individual difference. The most common explanation offered for the first six sentences of both B and C is to the effect that the missing word "just came" or words to that effect. This automatic way of filling the blanks through sheer verbal fluency seems nearly as pronounced with the younger as with the older subjects. In other words, in each test the task becomes suddenly difficult about sentence seven; frequently in-



dividual exceptions, however, must be made to this statement. From about sentence seven on the mental process changed from verbal fluency to a more conscious selective process. The introspections indicate that in the last two sentences of each test, with certain subjects, at least, the problem approaches the nature of a linguistic puzzle.

The older subjects (13 years on) are more likely to be critical as to matters of style and to give consideration to alternative methods of filling the blanks. For example, in B6, "She..... (can, may) if she will"; up to and through 12 years this blank was filled with whatever was verbally most fluent. (Individual introspections will of course reveal exceptions.) From 13 on nearly all of the subjects made "harder work" of such sentences. Interpretations in terms of *may* and *can* were frequent. "Does it mean she has permission if she desires (may); or she is able to do it if she wants to?" and so on. In this case it happens that either may or can is given full credit. A critical attitude increases the time score without increasing the quality score.

Terman suggests (Genius and Stupidity, page 43) that "Greater originality and less imitation displayed by the subject in language acquisition will mean a poorer showing in this test, all else being equal." Terman's completion material consisted of paragraphs of connected prose, in which this may have been true. With the sentence type of completion test used by Trabue, the experimenter finds nothing in the results or the introspections to justify the assumption that greater originality was a negative factor in the performance of the test. The problem is reduced to one of controlled association; verbal fluency, and the pressure of limited selection, play their part with reference to the subject's capacity or tendency in the creative or imaginative field. At least, the introspections or the choice of words in blank-filling fail to reveal such a factor.

7. Time and accuracy. Trabue permits 7 minutes for the filling of the blanks both for test B and test C. Usually the superiors required much less than this. Younger subjects (in some



cases) simply gave up the test without much effort on the last four sentences of each test, which, of course, means a short time and a low score. And in this connection it must be said that those who attempted the last four sentences (especially the last two) spent proportionally much more time for the extra accuracy score secured. For example, say a subject has successfully filled the blanks in the first six sentences, giving a score of 12; it is safe to say that in attempting to fill the remaining blanks the time is often increased two to fourfold for the sake of the addition of from two to four credits to the score.

The question naturally arises as to whether there is any correlation between accuracy and speed in performance. A correlation by the Pearson method gives the following:

	r.	P. E.
Trabue B, accuracy correlated with low time score...	.29	.086
Trabue C, accuracy correlated with low time score...	-.21	.090

The two correlations just about neutralize each other, seeming to indicate no general trend as regards accuracy and speed. Tabulation D was compiled in an effort to discover individual differences. The score (seconds) per unit of credit is secured by dividing the total time by the total score. It will be noted that those making conspicuously high scores (while not always making the lowest time score) have relatively low time scores. This seems to be especially true with the subjects from ten years up. X B has the highest score for that age with the lowest time score per unit of credit. The same may be said for XI A, XII D, XIV H, XV D. In the XV age group, the four lowest scores have the longest unit of time scores. Of the remaining low scores, the majority have long time scores, but no sweeping generalization is possible. There are marked exceptions; *e.g.*, XIII A, having the lowest unit of time score of any subject, along with one of the lowest qualitative scores. The explanation is very simple; the subject did the easier sentences and then stopped. As a generalization it seems safe to say: there is no general trend for speed and accuracy to correlate; however, an exception must be made of the subjects making very high and





# SUBJECTS (SUPERIORS) JUST MAKING OR FALLING BELOW TRABUE'S MEDIAN

1	2	3	4	5	6	7	8	9	10	11	12	13	14
Subject	Score on B Test	Score on C Test	Trabue Median Approximating Age Norm	Rank Order Vocabulary Test	Rank Order Chronological Age	Rank Order Analogies Total Accuracy Score	Total Ass. Rank Order	Directions C Time Rank Order	Marble Statue Rank Order	Proverbs Accuracy Total Rank Order	Trabue Combined Score Rank Order	Average Rank Order	Grade in School
XIII A-12- 7	12	8	13.3	14	29	9	35.5	17	21.5	11	4.5	22	8A
B-12- 8	9	15		25.5	30	35	18	41.5	(n)	21.5	16	27	12A
D-13	11	12		42	35	36	22	30.5	29	17	15.5	28	9A
F-12-10	10	16		30	32	35	30	43	29	21.5	21	30	9A
XIV B-13-11	12	15	14.2	30.5	38.5	53	47.5	44	39.5	33	24.5	44	8A
C-13-11	10	12		18	38.5	43.5	27.5	21	29	38.5	10.5	23	8A
G-14- 4	14	12		30	43.5	35	40	38.5	49.5	38.5	21	36.5	9A
XV A-14- 9	14	14	15.3	30	46	30.5	32	29	36.5	28	28.5	33	9A
C-14-11	13	14		37	48	16	37.5	33	33.5	24.5	24.5	32	11B
E-15	14	14		44.5	49.5	35	52	53	51.5	51	28.5	53	11A
F-15- 5	14	16		48	52	23.5	49	46	33.5	51	34.5	51	9A
G-15- 6	16	14		47	53	50	24.5	37	49.5	51	11.5	40	11B
H-15- 1	14	13		30	51	41	32	15	36.5	15	24.5	29	9B

NS

## Tabulation B

14

15

Grade in School	Remarks
8A	Russian Jewess. English poorly spoken. Piano practice. No interest in school.
12A	Russian Jew. English poorly spoken. Piano practice.
9A	Good American home. Interest in mechanical things.
9A	Good American home. Uses excellent English. Interest in Agriculture.
8A	Very cultured home. Speaks good English. Excellent in Latin.
8A	Russian Jewess. Poor home from standpoint of English.
9A	Excellent home. Interested in piano primarily. Splendid English student.
9A	Russian home. English in home fair.
11B	Brother of XIV-C. Interested in piano.
11A	Good home.
9A	Excellent home. Speaks excellent English.
11B	Good home. Speaks excellent English.
9B	Poor home. Speaks and hears very poor English.





very low scores. In these cases we find high scores with quick time and low scores with long time (with exceptions).

A correlation of unit of time with rank-order (columns 2 and 3, tabulation D) by the Pearson method, gives positive correlation of .562, with a P. E. of .064. In other words, there would seem to be a positive correlation between corrected time (penalized for error) and the subject's relative position in accuracy (expressed by rank-order).

TRABUE COMPLETION TEST B AND C  
Tabulation A  
Comparison of Trabue's Score with Superior Group

		Trabue*	Superior Group			
Age	Grade	Median Score for Test B and C	Test B Av.	Test B Med.	Test C Av.	Test C Med.
6			15.0	15.0	10.0	10.0
7	II	3.0	10.2	10.0	10.6	11.0
8	III	6.0	11.0	12.0	11.3	12.0
9	IV	8.0	14.0	14.0	12.5	12.0
10	V	9.6	14.0	14.0	12.4	13.0
11	VI	11.0	16.5	16.5	14.5	14.5
12	VII	12.3	16.0	16.0	14.8	15.0
13	VIII	13.3	13.4	12.0	14.1	15.0
14	IX	14.2	14.9	15.0	15.4	15.0
15	X	15.3	14.9	14.0	14.6	14.0
16	XI	15.8				
	XII	16.2				

\*From Trabue's "Completion-Test Language Scales," page 118.

## TRABUE COMPLETION—COMBINED SCORES

## Tabulation D

Average Time per Accuracy Unit

Subject	Seconds per Unit of Credit	Rank Order Trabue Combined Score	L = low score group H = high score	Subject	Seconds per Unit of Credit	Rank Order Trabue Combined Score	L = low score group H = high score
VI A-6-5	34	17.5	H	XIII A-12-7	7	4.5	L
VII A-6-8	25	3		B-12-8	15	16	L
B-6-9	..	n		C-12-9	17	48.5	H
C-7	28	10.5	H	D-13-6	37	14.5	L
D-7	..	n		E-13-6	15	45	H
E-7-2	35	10.5	H	F-12-10	32	20	L
F-7-2	42	4.5		G-13-3	18	24.5	
G-7-3	34	10.5	H	H-13-6	17	50.5	H
VIII A-8	22	6.5		XIV A-13-10	19	39.5	
B-8-2	39	6.5		B-13-11	16	24.5	L
C-8-6	23	17.5	H	C-13-11	29	10.5	L
IX A-8-11	37	10.5		D-14	22	51	H
B-9-3	20	31		E-14-1	29	31	
C-9-4	25	45	H	F-14-3	18	48.5	
D-9-3	37	14.5		G-14-4	32	20	L
X A-9-10	31	24.5		H-14-4	15	53	H
B-10-1	13	34.5	H	J-14-6	21	45	
C-10-1	25	24.5		XV A-14-9	30	28.5	L
D-10-2	25	10.5		B-14-10	26	39.5	
E-9-10	18	20		C-14-11	20	24.5	L
XI A-11-3	8	39.5	H	D-15	17	50.5	H
B-11-3	11	39.5	H	E-15	27	28.5	L
XII A-11-9	16	39.5		F-15-5	28	34.5	L
B-12-1	20	31		G-15-6	28	34.5	L
C-12-2	21	34.5		H-15-1	21	24.5	L
D-12-3	14	45	H				
E-12-4	15	39.5					
F-12-3	15	45	H				

Subjects marked "L" are tabulated in B; those marked "H" are tabulated in C.







# TRABUE COMPLETION TEST

# SUPERIOR SUBJECTS MAKING CONSPICUOUSLY HIGH SCORES

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Subject with Chronological Age	Rank Order according to Chron. Age	Binet Score	Binet Score Rank Order	I. Q.	I. Q. Rank Order	Trabue Total Score B + C Tests	Trabue Average Score B + C Tests	Trabue Medians Approximated to Age	Rank Order Vocabulary	Rank Order Analogies Total Accuracy Score	Total Ass. Rank Order	Directions C Time Rank Order	Marble Statue Rank Order	Proverbs Accuracy Total Rank Order	Trabue Combined Score Rank Order	Rank Order Average	Grade in School	Remarks on
VI A-6-5	1	11	4	172.9	52	25	12.5		3.5	6	5	9	17	n	17.5	3.5	4A	Best reader for her age of any tested. Mother has pr
VII C-7	4.5	11-6	6.5	164.3	48	22	11	3.0	5	4	13.5	10	17	14	10.5	8	2A	All VII-year subjects have excellent homes and
E-7-2	6.5	12	9	167.4	51	22	11		13	12	5	7	n	13	10.5	3.5	3B	Unusually dramatic. Unusual vocabulary; reads
G-7-3	8	9-11	2	136.8	28	22	11		3.5	5	7	4	17	n	10.5	5	none reads	Very strict training and old-fashioned methods of
VIII C-8-6	11	13-1	12	153.9	43	25	12.5	6.0	11.5	10	13.5	14	17	7	17.5	11	5A	Only child of divorced mother. Good English spo
IX C-9-4	15	15-6	20	166	50	32	16	8.0	38	26	20.5	30.5	46.5	33	45	21	4A	Excellent home; a fluent and inveterate reader. B
X B-10-1	18.5	15-5	19	152.9	39	30	15	9.6	10	21	24.5	26	41	19.5	34.5	19	5A	Home-life very commonplace but orderly and cl
XI A-11-3	21.5	14-2	15	125.9	13	31	15.5	11.0	15.5	18.5	26	28	51.5	44	39.5	24	6A	Very cultured home. Not orthodox, but rather c
B-11-3	21.5	16-10	25	149.6	35	31	15.5		30	38.5	29	52	7	28	39.5	36.5	8A	Child thrown with father, a capable, scholarly man
XII D-12-3	26.5	18-1	37	147.6	34	32	16	12.3	36	30.5	47.5	50	24.5	33	45	35	8A	Lives with maiden aunt. Strict, conventional but
F-12-3	26.5	16-10	25	137.4	31	32	16		19.5	18.5	41	25	9.5	23	45	31	8A	Russian Jewess. English not particularly well spo
XIII C-12-9	31	18-1	37	141.8	32	33	16.5	13.3	39.5	23.5	45	47	43.5	28	48.5	47	9B	Good and serious home. Mother teacher. Child
E-13-6	35	19	49.5	147	33	32	16		49	23.5	35.5	45	53	38.5	45	41	9A	Austrian Jewess. Home foreign in atmosphere bu
H-13-6	35	18-4	39	135.8	27	35	17.5		50.5	46.5	34	41.5	43.5	51	50.5	48	9A	Parents of unusual culture. Non-orthodox. Oral E
XIV D-14	40	18-7	47	132.7	22.5	36	18	14.2	46	43.5	46	38.5	14	38.5	51	49	10B	Father teacher of Spanish and French. Spanish.
H-14-4	43.5	18-6	42.5	129	16	37	18.5		42	46.5	20.5	12	39.5	51	53	38	9A	Cultured home. Child timid but quick mentally. Ro
XV D-15	49.5	19-2	51	127.8	15	35	17.5	15.3	50.5	41	43.5	18	46.5	47.5	50.5	50	9B	Home of wealth. Every advantage, high ideals but peare. Vocabulary very large. Inveterate r

OUSLY HI

14 15

marble statue Rank Order	Proverbs Accuracy Total Rank Order
7	n
7	14
n	13
7	n
7	7
6.5	33
1	19.5
1.5	44
7	28
4.5	33
9.5	23
3.5	28
3	38.5
3.5	51
4	38.5
9.5	51
6.5	47.5



# OUSLY HIGH SCORES

Tabulation C

14	15	16	17	18	19
Rank Order	Proverbs Accuracy Total Rank Order	Trabue Combined Score Rank Order	Rank Order Average	Grade in School	Remarks on Social History, Home, Culture, Early Training
7	n	17.5	3.5	4A	Best reader for her age of any tested. Mother has private school for little children. Deluged with reading games and word-building.
7	14	10.5	8	2A	All VII-year subjects have excellent homes and are good readers in every case before going to school.
n	13	10.5	3.5	3B	Unusually dramatic. Unusual vocabulary; reads much.
7	n	10.5	5	none	
7	7	17.5	11	reads	Very strict training and old-fashioned methods of teaching. Home-life narrow and religious.
6.5	33	45	21	5A	Only child of divorced mother. Good English spoken. However superiority in this test rather a surprise.
1	19.5	34.5	19	4A	Excellent home; a fluent and inveterate reader. Perhaps also one of the brightest of the group.
1.5	44	39.5	24	5A	Home-life very commonplace but orderly and clean. An excellent silent reader and splendid thinker.
7	28	39.5	36.5	6A	Very cultured home. Not orthodox, but rather conventional. Child reads all the time; dislikes play.
4.5	33	45	35	8A	Child thrown with father, a capable, scholarly man. Reads much and well.
9.5	23	45	31	8A	Lives with maiden aunt. Strict, conventional but commonplace home. Child reads much.
3.5	28	48.5	47	9B	Russian Jewess. English not particularly well spoken at home. Superficially at least very brilliant. Reads much.
3	38.5	45	41	9A	Good and serious home. Mother teacher. Child reads much; serious-minded.
3.5	51	50.5	48	9A	Austrian Jewess. Home foreign in atmosphere but very cultured. Brilliant in music. Reads much, began early, serious-minded.
4	38.5	51	49	10B	Parents of unusual culture. Non-orthodox. Oral English of child comparable to culture of college graduate. Book-worm.
9.5	51	53	38	9A	Father teacher of Spanish and French. Spanish. Child reads French, Spanish and English well. Reads much; fluent speech.
6.5	47.5	50.5	50	9B	Cultured home. Child timid but quick mentally. Reads much. Cannot account especially for high score. Solves puzzles well.
					Home of wealth. Every advantage, high ideals but not unusual culture. Child unusually brilliant. Old-fashioned. Fond of Shakespeare. Vocabulary very large. Inveterate reader.





## ANALOGIES TEST

*Description, Method of Procedure, Scoring.* The experiment is taken from Whipple's "Manual of Mental and Physical Tests," page 456. The only change in the procedure is the time allowed for response. Whipple permits the subject to have 30 seconds in which to reply. It seemed wiser, as the test was to be used with very young children, instead of adults, to remove any time limit.

*Results.* Norms had to be established for this test (tabulation A). In a few cases for each age (usually a few responses for certain subjects) the time scores were very long. This, as Whipple suggests, accounts for the median time scores being less than the average time scores. As indicated by the error scores, the C test was entirely too hard for the children 8 and 9 years of age. In some cases of 8- and 9-year-old children the score was 0.

1. Comparison of norms with superior group. (Using Tabulation A and Tabulation III, Appendix, as a basis.) (a) The median scores in both norm and superior groups are shorter time than the arithmetic means. An inspection of Tabulation III, Appendix, shows that this contrast remains true for the individual as well as for the group, although there are exceptions in individual cases. A study of the individual superior cases also shows that the average time is lengthened by a few very slow responses at each age. It is true, also, that the absolute difference between median and average becomes a little less with increase in age for both norm and superior group. Contrasting the superior and norm groups, age by age, the absolute median difference is less with increasing age. Exceptions both in individual cases and in averages may be found. On the whole, the contrasts are greater for the B than for the A test, and for the C than for the B test.

(b) Concerning errors. Tests A, B, and C grow progressively more difficult; B is somewhat more difficult than A, and C is decidedly more difficult than B. These contrasts hold for both the norm and the superior group; however, the contrasts (ab-



solute difference) are more marked in the norm than in the superior group. Contrasting by age: the absolute difference in number of errors is less marked between the older than the younger children. The greatest contrasts are for the superior group on tests A and B (especially up through age 11); less noticeable for test C. With the C test the difficulty for both the norm and the superior group is, undoubtedly, the shade of meaning in the mixed relations test; with tests A and B this is less pronounced, and fluency in reading, as well as associative control, becomes an important factor in speed, and probably indirectly in accuracy through greater refinement of word meanings.

2. Time and accuracy. In test A the accuracy score was too high to permit a comparison with the time score. In tests B and C the average time per correct response was correlated with the accuracy score (Pearson's method), giving a positive correlation of .438, P. E., .0756 for test C; and .579, P. E. .0622 for test B. This would seem to warrant the statement that high scores are found with short time and low scores with long time. With some of the tests, the Trabue, for example, it has been possible to show that the tendency to high positive correlation is peculiarly marked with the extremely high and the extremely low scores, and less clearly defined in the median group (of course, with very marked exceptions); this tendency is not so pronounced in the Analogies Test, B or C (Tabulation III, Appendix).

3. Correlations. The Analogies B test correlates very highly with the Binet tests, a positive correlation of .87. It stands eighth in the hierarchy of correlations, with an average tendency of correlation of .584 (Tabulation C, Correlations).

The three analogy tests were also correlated with each other for the average time per correct response (Pearson's method):

	r.	P. E.
Test A with Test B.....	.676	.0507
Test A with Test C.....	.462	.0749
Test B with Test C.....	.421	.0782

The correlations are not conspicuously high for tests of the same kind. Considering that Test B is a little more comparable in difficulty with C than Test A is, one would have anticipated a higher correlation between B and C than between A and C, and

this anticipation would seem to be furthered (*a priori*) by the practice and adaptation secured in the performance of the A test.

*Introspections.* The introspections indicate a wide range of individual difference regarding the character of the mental processes involved in reacting to the analogy cards. The analogies may be classified as follows: (a) those in which the fourth member is filled automatically. Familiar pairs, rhythms, verbal fluency, seem to characterize the mental process. (b) In more difficult analogies the attention is first on terms one and two, and then on three and the missing term corresponding to two. The relationship is seldom characterized by the younger children, but seems to be with the older ones. However, a formal naming of the relationship is not found except in a few cases of very mature subjects. (c) In certain cases the subjects note a discrepancy between the relation expressed in the first two and the last two members. This may be due to a restricted definition; *e.g.*, in card 5C, Blood : Flesh :: Gravy : ?, gravy is thought of as a sauce rather than the juice of the meat. Or again, the subject may demand a too exact analogy; *e.g.*, C4, Forest : Tree :: Seashore : ?. Here there is no fourth member which is so clearly a part of the third member as the second member is of the first. In many cases, the most common association is often the correct one. A notable instance is C8, Gulf : Sea :: Cape : ?. Here hesitation may be due either to the lack of a word or to an attempt to clarify and verify the response before making reply. In the latter case, the critical subject is usually surpassed by the more reckless. "Land" is perhaps the most natural association, but it is quite a different matter to fully determine the character of the analogy. (d) The introspections frequently show visual imagery; sometimes seeming to be relevant to the response, often not. (e) Failure to clearly grasp the relationship between the first and second members seems the most usual cause for incorrect response. In cases, some member of the analogy is not known, while the relationship may be very simple. C11, Bicycle : Tricycle :: Two Wheels : ?, is frequently missed by children



## ANALOGIES

## Tabulation A

Norm Group				Superior Group						
Age	Number of Cases in Norm Group	A			B			C		
		A. Time in Seconds per Exposure	Median Time in Seconds per Exposure	Av. No. Errors	A. Time in Seconds per Exposure	Median Time in Seconds per Exposure	Av. No. Errors	A. Time in Seconds per Exposure	Median Time in Seconds per Exposure	Av. No. Errors
6										
7	30	8.8	6.5	5.2	10.9	7.3	8.4	5.9	3	6.5
8	25	5.7	5.0	4.2	9.6	7.2	8.0	7.5	6.2	7.3
9	26	5.1	4.0	4.3	6.0	4.4	8.2	5.6	4.4	3.3
10	36	5.3	4.1	4.0	5.1	4.1	7.6	4.9	4.2	.9
11	32	4.8	4.2	3.6	4.8	4.5	7.3	4.8	4.2	2
12	29	4.5	3.3	3.5	4.9	4.0	6.1	4.0	4.0	1.3
13	29	4.8	2.8	2.5	4.7	4.2	6.4	3.0	2.6	2.1
14	30	3.8	3.2	2.1	4.1	3.8	6.1	3.9	3.0	1.8
15	41	3.6	2.8	2.1	4.4	3.2	4.3	3.9	3.2	1.5
16	41	3.4	2.6	1.1	3.8	3.1	3.1	3.9	3.1	2.0
17	32	3.1	2.3	1.1	3.9	3.0	2.2	3.8	3.1	
18										
C*	8	2.36	1.8		4.38	3.0				
C	19	2.64	2							
H.S. girls	30	3.16	2.4							
				6.51	3.4					
				15.8	14.5	18.1	4.8	5.6	5.0	1.0
				14.3	13.1	14.2	5.6	5.6	5.0	2.7
				12.1	10.1	10.8	4.0	4.0	3.8	.0
				10.2	9.1	8.9	4.1	4.1	3.8	.7
				9.7	8.2	8.1	3.7	3.7	3.7	2.5
				9.1	8.4	7.4	3.2	2.9	2.9	1.0
				8.3	7.0	6.8	3.1	2.6	2.6	.3
				8.2	7.1	6.3	3.4	3.1	3.1	.3
				7.7	6.2	6.2	3.4	3.4	2.7	.3
				7.8	5.3	6.1				
				7.2	4.8	6.2				
</										



but seldom by adults. Children fail to grasp the significance of *bi* and *tri*. Again, the subject may lose time or fail to reply because he knows no suitable response word, although the relationship may be clearly understood. A case in point is C12, Horse : Neighing :: Donkey : ?, in which the difficulty is not with the analogy but unfamiliarity with the word "braying."

Speaking in trends, Test A is more or less automatic even with children; Test B comes nearest to measuring conscious associative responses; while test C has many extraneous problems due to unfamiliar word-meanings or relationships.

*As is the case with so many other tests, only a careful consideration of the causes for long delayed responses and incorrect replies can be of value in determining the significance of either time or accuracy scores.*

ANALOGIES				Tabulation B			
Average Time per Correct Response							
Subject	A	B	C	Subject	A	B	C
Av. Time in Seconds	Av. Time in Seconds	Av. Time in Seconds	Av. Time in Seconds	Av. Time in Seconds	Av. Time in Seconds	Av. Time in Seconds	Av. Time in Seconds
VI A-6-5	5.1	9.1	33.6	XIII A-12-7	4.4	5.9	38.5
VII A-6-8	6	18.3	67.9	B-12-8	2.9	4.4	5.5
B-6-9	7	8.2	25	C-12-9	3.2	3.6	9.9
C-7	5.3	10.2	68.8	D-13-6	2.8	3.8	9.7
D-7				E-13-6	1.6	3.4	7.4
E-7-2	2.4	7.7	35.3	F-12-10	4.6	6.6	12.6
F-7-2	10.7	18.7	18.1	G-13-3	2.8	3.2	5.6
G-7-3	6	10.2	45.8	H-13-6	2.8	3.5	10
VIII A-8	3	5.6	13.1	XIV A-13-10	3.3	3.2	7.9
B-8-2	9	7.2	38.1	B-13-11	1.8	2.6	2.8
C-8-6	5.2	7.4	26.2	C-13-11	4.9	5.2	14.5
IX A-8-11	3.6	5.3	31.1	D-14	4.2	4.6	6.8
B-9-3	4.4	3.8	8.9	E-14-1	3.9	6.5	10.5
C-9-4	4	4.8	18.4	F-14-3	2.9	3.5	6.4
D-9-3	4	5.6	39.5	G-14-4	2.7	4.8	12.8
X A-9-10	4.5	2.5	2.7	H-14-4	4.4	4.2	7.5
B-10-1	3.7	6.3	11.9	I-14-6	2.5	2.6	6
C-10-1	4.1	7.1	8.7	XV A-14-9	3.8	3.7	10.9
D-10-2	4.8	6.4	24.1	B-14-10	6.6	6.4	8.2
E-9-10	4.3	4.3	22.2	C-14-11	3.6	5.2	14.3
XI A-11-3	3.6	4.9	16.6	D-15	3.5	4.2	13
B-11-3	4.7	3.8	5.7	E-15	2.9	3.3	10.2
XII A-11-9	4.6	3.2	6.2	F-15-5	2.6	3.9	12.8
B-12-1	5	3	12.9	G-15-6	2.5	3.6	7.9
C-12-2	2.9	4.8	8.6	H-15-1	1.7	4.2	6.5
D-12-3	1.8	1.9	4				
E-12-4	3.2	4.3	5.4				
F-12-3	2.8	3.3	14.1				

## MARBLE STATUE

*Description of the Experiment.* The test is taken from Whipple's "Manual of Mental and Physical Tests," page 575.

The test is scored for the number of correct ideas; synonyms, and paraphrasings were accepted as equivalent to verbatim report.

*Method of Procedure.* The subject was given a copy of the test, face downward. He was then given the following instructions: "I have given you a short story. When I say 'ready!', turn the sheet over and follow the story as I read it to you. As soon as I am through reading, turn your copy face downward. Then write as much of the story as you can remember." (*Tell me* instead of *write* in a few cases of children either unable to write, or with whom writing was a slow, attention-consuming process. The majority of the subjects preferred to write rather than to tell the story.) "If you can remember it in just the words you heard, use those words; but if you can't do that, tell in your own words, as well as you can, what it was that I read to you." (Paraphrased from Whipple, 573.) It required about 75 seconds to read the test.

*Aim of the Test.* In the Marble Statue Test the subject is asked to reproduce ideas rather than detached items as given; it is a test of immediate associative memory. Ability in this direction is undoubtedly of value in academic success (study, recitation, and examinations), and also in many clerical, vocational, and professional situations. As the test is given, it places a premium of the *number* of ideas, on the detail given, rather than on the schematic presentation of the essential of reading.

*Results.* The norms most nearly comparable with the superior group are those of Pyle. (Reported by Whipple, page 577.) They are compiled from group tests. It will be noted (Tabulation A) that the superior group through 11 years surpasses the norm group decidedly. The 12 year group (superiors) in contrast to their behavior in nearly all the other tests, are relatively



## MARBLE STATUE TEST (Pyle)

## Tabulation A

Age	Male			Female			Superior
	Cases	Averages	A. D.	Cases	Averages	A. D.	Average No. of Ideas
6							34
7							35
8	102	24.3	6.7	89	28.5	11.3	39.7
9	148	28.7	9.1	158	31.0	9.4	32.8
10	142	30.0	6.7	138	33.5	6.8	35.4
11	149	32.9	5.6	156	36.4	7.7	39
12	156	35.1	7.4	191	38.1	7.2	36.6
13	163	36.8	6.3	164	38.5	7.1	41
14	129	36.1	7.0	146	39.0	7.5	38.6
15	89	36.5	6.7	99	39.1	6.3	42.5
16	60	34.6	5.6	94	37.3	5.1	
17	45	34.6	8.7	81	36.6	6.9	
18	32	36.9	6.0	48	37.8	4.4	
Adult	65	38.3	7.0	86	40.1	5.9	

poor in this test. An examination of the individual records reveals a failure to report details. The older supernormals, 12 years on, are somewhat superior to Pyles' norms for the corresponding ages, although all scores (12 up), superiors as well as norm group, fail to show any clearly defined increase in score with increasing age.

Tabulation B, which brings together conspicuously high and conspicuously low scores, fails to reveal any general trends, or unique characteristics marking off either group. It must be borne in mind that the favorable comments (Remarks, Column 8) could be equally well said of many subjects not appearing in the tabulation. The experimenter believes that the most important single cause for high scores is a serious, earnest attempt to give all the details possible—the attitude of the cautious student who gives all to be on the safe side. Of the subjects making high scores, not one is of the type distinctly independent of school prestige. XV C, who represents the independent type splendidly, gave an average report (39) but omitted details (qualifying adjectives, especially). On being questioned as to whether he could give more details, he replied: “O, yes, yes, (irritated) I suppose I could have, but that is enough; the meaning is clear.” The contrast between good and bad report is peculiarly marked with XI A and XI B. XI A is the docile, painstaking, conscientious



MARBLE STATUE  
Conspicuously High and Conspicuously Low Scores  
Tabulation B

Subject	Idea Score	Binet Score	Binet Score	Rank Order	Chron. Age	Rank Order	Sex	Remarks
VII F-7-2	43	160.5	6.5	6.5	6.5	7.0	F	Typical good student. Good reader. Cautious. Jewess.
VIII B-8-2	47	153.0	11.0	12.0	10.0	12.0	M	Shrewd, quick. "Thick-skinned Jew."
IX B-9-3	21	156.8	16.0	16.0	13.5	16.0	M	Poor home. Dreamy. Not a good student. Jew.
X C-9-4	44	166.0	30.0	21.0	15.0	21.0	M	Excellent home. Reads much. Very brilliant. Adult thinker.
X B-10-1	42	152.9	19.0	19.0	18.5	19.0	M	Adult type decidedly. Very serious. Good reader. Good thinker.
XI A-11-3	52	125.9	15.0	24.0	21.5	24.0	F	Typical good student. Reads much. Plays little. Literary. Romantic.
B-11-3	21	149.6	25.0	36.5	21.5	36.5	M	Far superior to XI natively. Adult attitude. Reduces things to essentials.
XII B-12-1	43	153.1	42.5	46.0	24.0	46.0	F	Excellent home. Literary ability. Temperamental, romantic. Reads much.
F-12-3	29	137.4	24.0	31.0	26.5	31.0	F	Good student. Quick superficial type. Should score high. Jewess.
XIII C-12-9	43	141.8	37.0	47.0	31.0	47.0	F	Serious, timid, overly cautious. Excellent student and worker.
E-13-6	55	147.0	49.5	41.0	35.0	41.0	F	Brilliant piano student. Exact, businesslike. Splendid music-memory. Jewess.
H-13-6	43	135.8	39.0	48.0	35.0	48.0	F	Excellent home. Bookworm. Literary type. Good memory.
XIV G-14-4	48	129.6	47.0	36.5	43.5	36.5	F	Good home. Brilliant pianist. Remarkable musical memory. Quick. Dynamic.
XV D-15-5	44	127.8	51.0	50.0	49.5	50.0	M	Good home. Excellent student. Literary ability. Reads much.
F-15-5	52	126.5	52.5	51.0	52.0	51.0	F	Good home. Businesslike. Very quick. Reads much.
G-15-6	46	122.6	49.5	40.0	53.0	40.0	M	Good home. Slow appearing, but good thinker. Precise.

type, imbued with the sacredness of school. XI B is the brilliant type with sluggish physical attitude. Without doubt very much superior to A as indicated by columns 3, 4, and 6, and also by his introspections and superior adult type of thinking. His score in the Marble Statue is but half that of A. The examination of his report shows no errors and is marked by its terse, abrupt sentences, giving the gist of the narrative.

*Correlations.* The Marble Statue has the lowest average correlation ( $r .272$ ) of any of the tests given, and likewise the lowest correlation with the Binet Tests ( $r .386$ ). It also correlates poorly with Vocabulary ( $r .366$ ) and average rank-order ( $r .420$ ). The inference would seem to be that the test does not differentiate either for intelligence or for scholarship. *A priori*, a test which measures associative learning, or "logical memory," as it is sometimes called, ought to correlate very highly with linguistic ability and school attainment. An inspection of Tabulation I, Appendix, and also the individual reports, seem to offer at least a partial explanation. (a) The test as a whole favors the child who is in the habit of reading much. Reading ability at an early age is a distinct accomplishment of the group as a whole. The scores of the younger children are consequently, relatively too high to admit of progressive increase with increasing age. Furthermore, there is little increase in idea-score even from 6 years to 12 years. (b) The older subjects are but slightly superior to the norm groups of the same age. From 12 years on, there is little age differentiation in either norm or superior group. (c) The method of scoring ideas gives equal credit or value to each idea, while from the standpoint of the essentials of the story, some are more important than others. The study of the individual reports shows a tendency for the younger subjects to report detail more faithfully and to resort to less paraphrasing than the older subjects, to give much detail in the first part of the story even if the essentials are somewhat abbreviated at the latter part of the legend. On the whole, this tends to draw a high idea-score for the younger subjects. The older subjects (12 years up) pay less attention to the details

but tend to retain the essential scheme of the story throughout. (d) Finally, the story is too short and simple in character for the supernormal children to admit of degrees of superiority from age to age. The experimenter believes that a more intricate test, perhaps a little longer, scored so as to give additional credit for essential ideas, would show a progressively increasing idea-score with increasing age. In this case the test would probably correlate very high with tests of linguistic ability and take a much higher position in the hierarchy of correlations.

This test brings out in a peculiar way the importance of analyzing the nature of the individual scores in considering the significance of any correlation.



## HEALY-FERNALD CONSTRUCTION BOARDS

*Description of the Experiment. Method of Procedure.* A description of the test and the method of procedure will be found in "Tests for Practical Mental Classification," Healy and Fernald, Psychological Monographs, Vol. XIII, No. 2, pp. 14-16. Tabulation A contains the norms of Dr. Gertrude E. Hall. The scores consisted of time, number of moves, and the method of procedure.

*Results.* This test proved unsatisfactory with the superior group as a whole. Up through the ten year group, at least, the superiors surpassed by far the corresponding norm groups of Dr. Hall, both in speed and accuracy (number of moves). The superiority of the selected group is less pronounced for ages 11 and 12. With the 13, 14, and 15 year groups there is little uniformity in procedure, especially with the B test. Considering both speed and moves, the superiors, ages 13, 14, and 15, are inferior in the B test to the 12 year norm group. The 13 superior are much inferior to the 12 norm in the A test. The experimenter has no single explanation to offer for the behavior of the superior group. In some cases the subject may have had an academically (verbal rather than motor) habituated attention. With some there was a lack of interest in the problem, which is probably only another way of saying the same thing. With others, there was a seeming lack of coherency, and a trial and error method, which were in decided contrast to the superior performance in other tests. On the whole, though, the performance of the superior group was marked by intelligent procedure, emphasis on accuracy rather than speed, and a certain caution on the part of the older subjects which probably arose from an over-estimation of the difficulty of the problem.

THEALY-FERNALD CONSTRUCTION BOARD

Age	A Test					Norm					B Test					A Test					B Test					Superior				
	No. Tested	No. Successful	% Successful	Av. Time in Seconds	Av. Deviation Seconds	Stand. Deviation Seconds	Average No. Moves	No. Successful	% Successful	Av. Time Seconds	Av. Time Seconds	Average No. Moves	Av. Time Seconds	Median Time Seconds	Average No. Moves	Median No. Moves	Av. Time Seconds	Median Time Seconds	Average No. Moves	Median No. Moves	Av. Time Seconds	Median Time Seconds	Average No. Moves	Median No. Moves						
6	30	15	50	126.8	63.04	76.23	26.5	11	36.6	199.3	29.45	202	71.0	57	24	25	46	*	17	18	*	17	18	*	17					
7	30	16	53.3	133.5	78.37	90.16	34.1	15	50.0	137.0	21.70	36.3	27.0	15	10	10	44.3	43.0	19	21	24	24	24	24	24	24				
8	30	29	96.6	95.9	69.69	79.12	25.0	24	80.0	119.76	23.7	63.7	28.5	17	12	12	107.5	53.5	22	15	15	22	15	22	22	22				
9	30	27	90.0	75.5	57.76	68.28	21.0	21	70.0	106.3	24.8	63.2	42.0	19	11	11	42.6	39.0	12	11	11	12	11	12	12	12				
10	30	27	90.0	48.5	34.32	45.85	17.4	26	86.6	104.96	22.2	42.5	*	6	9	*	218.5	*	37	*	*	37	*	37	37	37				
11	30	27	90.0	41.8	27.31	41.03	17.1	26	86.6	80.50	20.0	26.6	26.0	8	18	18	142.8	89.0	29	17	17	29	17	29	29	29				
12	30	28	93.3	41.8	27.31	41.03	17.1	26	86.6	80.50	20.0	26.6	26.0	8	18	18	142.8	89.0	29	17	17	29	17	29	29	29				

Norm group Tabulation compiled from "Forty-eighth Annual Report of the State Board of Charities, New York, 1914," Vol. I, pp. 487, 489 and 493 (From Report of Dr. Gertrude Hall).

## PROVERBS TEST

*Description of the Experiment. Scoring.* The material for the test consists in the four accompanying sets of proverbs which, as indicated in the instructions, are to be matched with the statements. The tests are scored in per cent, while a time record is kept for each sheet. In Tabulation IV (Appendix) the complete scores are brought together, with total time, total score, average time, and average score for the four tests. The experimenter is indebted to the Buckel Foundation Laboratory, Stanford University, for the use of the test.

As no norms existed, it was necessary to establish them (Tabulation A). They are compiled from individual tests, following the same procedure as that used with the superior group.

*Aim of the test.* The Proverbs Test is essentially a language, verbal, and meaning test. It demands the ability to interpret a refined figurative meaning into the sentence and to recognize its analogous counterpart when couched in entirely different phraseology. It will be noted that mere verbal analogies are often not only useless but even misleading. Back of the more or less superficial interpretative linguistic ability is perhaps a sort of fundamental capacity of making shrewd logical decisions, and of sharply contrasting intrinsic and verbal analogies. In other words, the correct matching of proverbs with statements rests upon a nicety of meanings.

This test, then, is useful in estimating linguistic, reading, and interpretative ability, and the capacity to grasp fine shades of meaning. Such a capacity would be of value in all academic situations, appreciation of literature, and intelligent general reading. Granting average intelligence, a superior score could, conceivably, easily rest on familiarity with common proverbs picked up under favorable conditions. However, peculiar ability in handling this test, may, with children at least, readily imply an exceptional ability in distinguishing subtle shades of meaning, and a certain ability in generalizing abstraction.



## THE PROVERBS TEST

(Before each proverb place the number of the statement which explains it.)

## I

## PROVERBS

The early bird catches the worm.  
Don't cross a bridge till you get to it.  
Don't cry over spilt milk.  
Birds of a feather flock together.  
Don't judge a book by its cover.  
Paddle your own canoe.  
The watched pot never boils.  
Cut your coat according to the cloth.  
Empty vessels make the most sound.  
Figs do not grow on thistles.

## STATEMENTS

1. It is foolish to worry about things we can't help.
2. People seek the company of those who are like them.
3. Depend on yourself.
4. Impatience makes the time seem longer.
5. Good does not come from evil.
6. There is no one so wise that he is not sometimes a fool.
7. If you would succeed, be on time.
8. Don't believe everything you hear.
9. External appearances may be deceiving.
10. Those who are the most boastful are the least important.
11. Do not worry over troubles before they come.
12. Make your plans fit the possibilities.

## II

## PROVERBS

The burnt child dreads the fire.  
Rome was not built in a day.  
He who is in the mud likes to pull another into it.  
Plants oft removed never thrive.  
Great ships require deep waters.  
When the cat is away the mice will play.  
Half a loaf is better than none.  
The proof of the pudding is in the eating.  
The mill does not grind with the water that has passed by.  
Every path has its puddle.

STATEMENTS

1. Time is required to produce anything of value.
2. Failure follows frequent change of plan.
3. If we can't have all we want we should take what we can get.
4. Unhappy experiences teach us to be careful.
5. We should take advantage of opportunities as they come.
6. When authority is absent evil flourishes.
7. We desire most that which we do not have.
8. A thing must be tried before we know its value.
9. Every occupation involves some work that is not pleasant.
10. Those in disgrace always want to disgrace others.
11. What has been done can be done again.
12. Important work can only be done by able men.

III

PROVERBS

All is not gold that glitters.  
A drowning man will grasp at straws.  
A bird in the hand is worth two in the bush.  
It is a long road that has no turn.  
A stitch in time saves nine.  
Every rose has its thorn.  
Too many cooks spoil the broth.  
He who would eat the kernel must crack the nut.  
One swallow does not make a summer.  
A mouse must not think to cast a shadow like an elephant.

STATEMENTS

1. It is better to be content with little than to gamble for more.
2. It pays to attend to troubles before they get worse.
3. Those who would reap rewards must work for them.
4. Appearances are often deceptive.
5. It is best to be silent when there is nothing to say.
6. Division of responsibility brings poor results.
7. Desperate people cling to absurd hopes.
8. One can not have the same luck forever.
9. Do not attempt the impossible.
10. There is no happiness without its pain or sorrow.
11. A single sign is not convincing.
12. It pays to do only one thing at a time.

## IV

## PROVERBS

Make hay while the sun shines.  
In a calm sea every man is a pilot.  
A tree is known by its fruits.  
Rats desert a sinking ship.  
Destroy the lion while it is young.  
Where there is smoke there is fire.  
No wind can do him good who steers for no port.  
Plant the crab tree where you will it will not bear sweet apples.  
Meddle not with dirt—some of it will stick to you.  
People who live in glass houses must not throw stones.

## STATEMENTS

1. Deeds show the man.
2. No object can be attained without some sacrifice.
3. False friends flee from us in disaster.
4. Association with evil is sure to leave its effect.
5. Suspicions always have some basis.
6. Leadership is easy when all goes well.
7. Environment will not change one's nature.
8. Who undertakes too much accomplishes little.
9. Make the best of your opportunities.
10. Those who have faults should not criticise others.
11. We can not help those who have no object in life.
12. Weed out bad habits before they are too firmly established.

*Results.* Comparison of norm groups with superiors. Tabulation A gives the data for the two groups. It will be noted that tests I, II, III, and IV, prove successively more difficult for both the norm and the superior groups, both from the standpoint of time and accuracy, although exceptions exist. Test IV is decidedly more difficult than the preceding three. Differences for both groups (as regards time and also accuracy) are more marked with the younger children. As so often noted in other comparisons between the norm group and the superior group, the contrast between groups is also more marked with the younger children. The accuracy scores for ages 9 and 10 (norm group) are somewhat lowered by a few subjects almost incapable of performing the tests at all. A similar condition (but more



marked) exists for the superior group (age 7). The superiority of the supernormal group is considerably accentuated if we bear in mind that at every age they surpass in *both* speed and accuracy. Another factor of great significance is the more frequent awareness of error on the part of the superiors. For example, while the 7 year superiors are about on a par with the 9 year norm group as regards accuracy, they were much more ready in recognizing inability to perform at all, and more discriminating in recognizing their own doubtful answers. The contrast is less marked as both groups increase in age, but maintains to some extent for all ages. *The superiors seem to approach a more adult type of self-criticism.* The norm group from 15 years up and the superior group from 11 years up are fairly comparable in their mental attitude.

Conspicuously high and conspicuously low scores. Tabulation B consists of data that would seem, *a priori*, to have a bearing on linguistic ability and appreciation of fine shades of meaning. The rank orders, rather than actual scores, seem more significant of relative superiority or inferiority in the various tests. (1) There is a decided tendency for subjects making high scores in the Proverbs Test to surpass in the Binet Tests (comparison of columns 2, 3, and 7). On the other hand, low scores in the Proverbs Tests are accompanied by relatively low rank-order scores in the Binet Tests. (2) The conspicuously low accuracy scores are with but one exception (IX D) below the corresponding norms (compare columns 7 and 9). (3) High vocabulary scores accompany high Proverbs Test marks, and, *vice versa*, low vocabulary scores accompany low Proverbs Test Scores (compare columns 2, 7, 10). (4) With but slight exception, statement "3" may be repeated for the Trabue rank-order scores (compare columns 2, 7, 11). (5) Inspection reveals little indication of correlation between the Marble Statue rank-order and the Proverbs Test (compare columns 2, 7, and 12). (6) Statement "5" may be repeated for the Directions Test C (columns 2, 7, 13). (7) Although slight exceptions exist, the rank-order average tends to correlate with the Proverbs Test (columns 7 and

14). (8) With the exception of XII C, the general social history seems to be contributory to, and more or less explanatory of, the Proverbs Test score. (9) In summary. There is considerable evidence evinced in Tabulation B of a general ability in handling language and meanings, that makes itself felt in corresponding high or low scores in the series of language tests.

Accuracy. The question arises as to whether accuracy in one proverbs test is indicative of accuracy in another. The following correlations are by the Pearson method:

#### CORRELATIONS BETWEEN ACCURACY SCORES

	r.	P. E.
Test I with Test II .....	.580	.065
Test I with Test III .....	.650	.057
Test I with Test IV .....	.723	.047
Test II with Test III .....	.702	.049
Test II with Test IV .....	.670	.054
Test III with Test IV .....	.835	.029
Total Score with Test I.....	.742	.044
Total Score with Test II .....	.937	.012
Total Score with Test III .....	.804	.035
Total Score with Test IV .....	.917	.012

The tests were given in the order, I, II, III, and IV. There is a general tendency for the coefficient of correlation to increase, respectively, in the order in which the tests were given. This is, perhaps, safely attributed to learning. The total score would contain a summation of the common factor or factors and would consequently correlate higher with any test than the corresponding inter-correlation between two tests. The correlations indicate that a person making a high score in one test is likely to make a high score in all of the tests. The average accuracy for the 46 subjects taking all of the proverbs tests is: Test I, 85%; Test II, 82%; Test III, 77%; Test IV, 76%. This indicates a very slight increase in difficulty, respectively, with tests I, II, III, and IV. However, the increased difficulty is greater than indicated by the average accuracy as the subject gains something by way of adaptation from test to test.

Time and accuracy. Using totals and correlating (Pearson's







method) time and accuracy,  $r$  is found to be .373 with a P. E. of .085, indicating very little tendency for speed and accuracy to be correlated. However, (Tabulation B) those making very high scores also have relatively short time; it is not possible to say that those making low scores tend to take longer time, although it is true in some cases. The same old difficulty of finding some common measure for speed and quality combined, arises. If one divides the total time of a subject by the number of correct responses, no allowance is made for the effort spent on wrong answers. And, on the other hand, a low score may have been secured by quickly dismissing a proverb which proved too difficult to solve with ease.

Introspections and psychologizings. The psychologizings and introspections show a remarkable range of procedures, devices, and imageries. There is not only a great difference in the individual procedure, but often an equally great difference from proverb to proverb with the same subject. The following seem the most common methods of reference or identification:

1. Get logical import of proverb and then run through the statements for identification.
2. Identification by superficial analogies between proverb and statement. This may be verbal, visual, similarity in structure.
3. Identification by vague schematic imagery.
4. Usually no definite paraphrasing of meaning of the sentence, rather vaguely sensed. Sometimes the whole proverb was repeated over and over while examining the statements.
5. Sometimes proverb was translated into more familiar terms before attempting to identify it.
6. Sometimes (about the only procedure with some) the most probable statement is selected rather than a precise determination of the meaning of the proverb.
7. With a large majority of the subjects there is a concomitant flow of vague spacial, visual, and verbal imageries. Sometimes this imagery seems to have a definite function in selecting the statements and sometimes not. At least as far as the subjects were able to tell, there was much irrelevant and useless imagery.



PROVERBS TEST

SUBJECTS MAKING CONSPICUOUS

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Subject	Rank Order Chron. Age	Binet Score Rank Order	I. Q.	I. Q. Rank Order	Proverbs Av. Time Total	Proverbs Accuracy Av. Total	Proverbs Norm Av. Time Total for Chron. Age	Proverbs Norm Av. Accuracy Total for Chron. Age	Vocabulary Rank Order	Trabue Rank Order Combined Score	Marble Statue Rank Order	Directions C Time Rank Order	Rank Order Average	Sex	
VIII B- 8-2	10	11	153	40	6:15	25			8.5	6.5	48	11	12	M	
IX B- 9-3	13.5	16	156.8	44	7:11	95	9:06	33	17	31	6	6	16	M	
D- 9-3	13.5	10	133	25	5:42	42.5			6.5	14.5	29	16	14	F	
X D-10-2	20	8	114.3	2	6:05	42.5	8:49	48	8.5	10.5	21.5	23	10	F	
XI A-11-3	21.5	15	125.9	13	2:47	95	7:54	56	15.5	39.5	51.5	28	24	F	
XII A-11-9	23	42.5	157.4	45	4:01	95	6:49	68	52.5	39.5	29	34.5	42	M	
C-12-2	25	23	136.9	29	5:12	62.5			21.	34.5	(n)	24	20	M	
E-12-4	28	42.5	150	36	3:37	97.5			52.5	39.5	21.5	40	43	M	
XIII A-12-7	29	17	116.6	3	4:39	42.5	5:42	73	14.	4.5	21.5	17	22	F	
H-13-6	35	39	113.8	27	2:15	100			50.5	50.5	43.5	41.5	48	F	
XIV E-14-1	41	47	132	20	4:19	95	5:20	79	22.5	31	12.5	32	25	M	
H-14-4	43.5	42.5	129	16	3:34	100			42.	53	39.5	12	38	F	
XV E-15	49.5	52.5	130	18	2:29	100	4:57	84	44.5	28.5	51.5	53	53	M	
F-15-5	52	52.5	126.5	14	2:30	100			48.	34.5	33.5	46	51	F	
G-15-6	53	49.5	122.6	8	3:01	100			47.	34.5	49.5	37	40	M	
H-15-1	51	28	113.8	1	3:36	57.5			30.	24.5	36.5	15	29	M	



CONSPICUOUSLY HIGH OR CONSPICUOUSLY LOW SCORE

Tabulation B

15

16

Average	Sex	Remarks on Social History, Home, Culture, Early Training
2	M	Jew. Home average culture but somewhat foreign.
5	M	Home very poor. Jewish. Child romantic, fond of stories.
4	F	Good, commonplace home. Child typical good student.
4	F	Good, commonplace home. Strict, religious. Learned to read at home very young.
2	F	Very cultured home, not orthodox but conventional. Reads much. Dislikes play.
2	M	In 12 yr. H. S. Mother devotes much time to training. Read early and reads much.
0	M	Good home. Strict training. Typical boy's attitude. Reads much. Not academic.
3	M	Spanish. Product of private schools. Linguistic ability. Home culture fair.
2	F	Jew. Musical ability. Not interested in school. Home poor from Eng. and cultural viewpoint.
3	F	Typical good home. Academic type. Reads much. Linguistic ability.
3	M	Jew. Home but medium from standpoint of English and culture. Typical student.
8	F	Good home but no particular condition to warrant score.
3	M	Home good. Child unusually quick. English in home good.
1	F	Superior home. Excellent student. Dynamic and academic.
0	M	Good home. Fair English. Nothing to warrant exceptional response.
9	M	Poor home. Poor English. Poor Student. Non-academic.



8. With the more difficult proverbs, and with the older subjects, there was a tendency to make distinct logical comparison in verbal terms.

9. Selection was often made by some one word conveying sufficient meaning to bring about identification.

10. Often symbolic or schematic imagery seemed to be the most pertinent factor in making selection.

11. Failure to grasp the idiomatic figurative import of certain of the proverbs figured in the incorrect identifications of some of the foreign children.



## RELATIVE VALUES

*Description of the Experiment.* The material consists of a reference card, five preliminary or trial cards, and a series of twenty exposure cards which are scored on the accompanying score card.

### REFERENCE CARD

A is larger than C  
B is larger than D

*Directions:* In each of the following statements tell whether it is:

1. True
2. Not true
3. May be true

### PRELIMINARY CARDS

1. C is less than A
2. D is less than B
3. C equals D
4. D is larger than B
5. C is larger than A

### EXPOSURE CARDS

1.  $A+B$  is larger than C
2.  $A-C$  is larger than  $B-C$
3.  $A-B$  is larger than  $C-D$
4.  $A+B$  is larger than D
5.  $B-A$  is less than  $D-C$
6.  $A+D$  equals  $B+C$
7.  $B+C$  is less than  $D+A$
8.  $A-B$  equals C
9.  $B-D$  is larger than  $A-C$
10.  $B-C$  equals D
11.  $C+D$  is larger than  $B+A$
12.  $A+B$  is larger than  $D+C$
13.  $A-B$  is less than  $A-D$
14.  $B-C$  is larger than  $D+A$
15.  $B+D$  equals  $C+A$
16.  $B+C+D$  is less than  $A+B+C$
17.  $A+B+C$  is larger than  $A+B+D$

18.  $A - C + D$  is larger than  $B + A$   
 19.  $B - C + A$  is less than  $D + A - C$   
 20.  $B + D + A$  is less than  $D + C + B$

Reference card and exposures cards are of heavy cardboard,  
 5" x 3".

RELATIVE VALUES TEST  
 SCORE CARD

No.	Response	Time	Correct	Remarks
1			+	
2			+ -	
3			+ -	
4			+	
5			+ -	
6			+ -	
7			+ -	
8			+ -	
9			+ -	
10			+ -	
11			-	
12			+	
13			+	
14			+ -	
15			+ -	
16			+ -	
17			+ -	
18			-	
19			-	
20			-	

Average time

*Method of Procedure.* The instructions were as follows: "A is larger than C. B is larger than D. (Showing the Reference Card.) A may be any number just so that it is larger than C. B may be any number just so it is larger than D. If A were five, C would have to be some number less than five. If A were fifty, C would have to be what? If B were a thousand, C would have to be some number less than what? A, B, C, and D may have any values, the only requirements being that C be less than A, and D be less than B. You do not know what relation exists between A, B, or D; or what relation exists between C, and B or D. On each one of the cards I have here is a statement. You are to refer it to the reference card and decide if this statement is true, not true, or whether it may be true. 'May be true' means that certain values could be given to A, B, C, and D, such that the statement on the card under consideration might or might not be true." The preliminary cards are then presented one at a time. They are of such a nature as to bring out the full meaning of the above instructions. The instructions regarding speed and accuracy were as follows: "Be sure that each answer is correct; accuracy is much more important than speed in this test." The twenty exposure cards are then given, one at a time, with the pre-signals of: "Ready! Look!" The time and nature of the response are noted on the score card. + is used for "true"; + — for "may be true"; and — for "not true." Total and average time are noted at the bottom of the score card and the accuracy score in percent. In the "Remarks" column is noted any introspections or psychologizings that seem to throw light on the nature of the mental process. (The question of negative numbers did not arise.)

*Aim of the test.* The relative values test is patterned after the problems of symbolic or algebraic logic. It will be noted that the values given A, B, C, and D must be conceived by the subject as relative in value. To attach definite values to the letters, robbing them of their relative character, will give a correct solution for the particular concrete values selected, but will ignore other assignable values for A, B, C, and D, in which the re-



quirements of the Reference Card would be fulfilled, and at the same time necessitate a change in one's pronouncement as to the validity of the exposure-card statement. Take, for example, exposure card 2:

A — C is larger than B — C. We would have as concrete values:

25 (A) is larger than 4 (C)

200 (B) is larger than 100 (D)

Then,  $25 - 4$  is larger than  $200 - 4$ , which is not true.

Again, 15 (A) is larger than 1 (C)

12 (B) is larger than 11 (D)

Then  $15 - 1$  is larger than  $15 - 11$ , which is true.

Therefore, the statement on the exposure card may or may not be true.

The problem, then, is to constantly bear in mind the relative character of the values. To assign arbitrary values is fatal to correct judgment of the exposure-card statements.

It seems plausible that the test may throw light on the following:

1. The ability to maintain a problematic set and to limit action to the right direction.
2. The ability to suspend judgment, and to consider several possibilities before coming to a conclusion.
3. The ability to recognize degrees of truth, a thing so essential to correct balance in judgment and criticism of a problem or of one's own attitude.
4. The ability to go from concrete cases to generalizing abstractions. It has been suggested over and over by various writers that accuracy (and possibly speed) in handling abstractions, and in substituting general values for concrete, is one of the factors of intelligence.

*Results.* Comparison with norms (Tabulation A). Also see Tabulation IV, Appendix. Age for age, the accuracy score is higher with the superiors than with the norm groups. Ages 7, 8, 9, and 10 superior, are about on a par with 13 norm. In both norm and superior groups, there is a decided jump from 14

year to 15 year performance. 15 year superiors slightly surpass 18 year norm in accuracy. Through age 12, the superior groups surpass the norm groups in speed; from 12 years on (considering both median and average) the norm groups slightly surpass the superiors. The greater accuracy of the superior groups more than counter-balances this with any particular age. However, 18 year norm group is very close to the superior group of 15 years in accuracy, and somewhat superior in speed. The emphasis in the instructions is designed to secure accuracy instead of speed, and a high accuracy score regardless of time score, must be considered as a superior performance.

Conspicuously high and conspicuously low scores. There is not the sharp contrast of high and low scores in this test found in so many of the tests used. The test was too difficult for the younger subjects, and considering the relatively long time required for both the 14 year and the 15 year superior group, the test was sufficiently difficult for them. The test was difficult for the 18 year norm group.

*Correlations.* A correlation by Pearson's method of speed with accuracy gave a negative correlation of .484 (P. E., .082). This is probably due chiefly to two factors: (1) That to fully sense the problem was to see possible complications. The introspections of several of the superior subjects making unusually high accuracy scores show that they had the correct solution long before stating it. They reviewed the problem for a possible exception. (2) With the younger subjects a too difficult problem was no problem, and some of the more difficult exposures were dismissed with what amounted to little more than a guess.

The Relative Values Test stands thirteenth in the hierarchy of correlations. This is probably due to the following factors: (1) The Binet Tests, Vocabulary, Proverbs, Analogies, Trabue, Directions, and Association Tests, all depend on the common or group factors of associative fluency in verbal, linguistic, and word-meaning situations. (2) The Binet and the Rank-Order Average are both composite scores and correlate highly with many other tests because they represent the summation of certain com-



mon factors (or factor). (3) The test was too difficult for the younger subjects.

*Introspections and psychologizings.* The Relative Values Test is the most significant of all the tests used from the standpoint of introspections and psychologizings. Even where the solutions were not correct, the appreciation of the nature of the problem and at least self-criticism with incorrect solution mark a superior mental attitude. Superficially, the problem seems highly controlled, but in practice it has proven very difficult to select the essential attitudes of mind, nature of imageries, and methods of solution that typify the procedure in general. It is the belief of the experimenter that the accuracy score plus a careful consideration of the nature of the thinking involved, constitute one of the best single devices for investigating some of the essentials of rational thought process. It hardly need be added that the reverse need not be true; failure to get an intelligent response is not necessarily indicative of lack of intelligence. The following seem to be the most essential gleanings from the introspections and psychologizings (principally psychologizings):

1. Visual schemes of position, of up-and-downness, of right-and-leftness, etc., are constant concomitants in solution.
2. Judgments are often of a verbal-logical nature. Sometimes meaning or assurance is secured by a very measured, intense, incipient pronunciation of the problem itself, or of some phrase that seems to be the crux of the solution.
3. There were often fleeting images in the background of consciousness of motion, bulk, etc.
4. Often there was no clearly defined logical process. Sometimes a matter of attitudes rather than images.
5. There was a vague attitude of relationships which is difficult to define. A sort of implicit recognition of the fact that A and C, B and D belong together, and an explicit knowledge that the pairs are irrelevant one to another. Sometimes this distinct lack of relationship between the two reference-card statements was clearly sensed, generalized, and used as a criterion for judging the exposure card; thus in the exposure 14,



larger than)

$B - C$  is less than  $) D + A$ . Consequently, in such a combination, "May be true" would be the solution irrespective of which of the three possible statements was given. Usually, even where used successfully, the general principle remained vague and shadowy.

6. A very essential factor in solution was the elimination of a factor (or factors) common to both members of the statement; *e.g.*, in exposure 11

$A + B + C$  is larger than  $A + B + D$

reduces to  $C$  is larger than  $D$

Perhaps this was the most important single factor in increasing speed and accuracy, and eliminating associative confusions. With some the location of the common factor (arrangement of the group) played an important part, thus:

Exposure 20,  $B + D + A$  is less than  $D + C + B$   
was more difficult to sense than

$B + D + A$  is less than  $B + D + C$ ,

in other words, recognition of the essential of the problem, irrespective of superficial complexity produced by arrangement of the letters.

7. The suggestive effects of guessing played a part. The subjects tended to alternate, in a rough way, "True, Not True, May be true," consequently, in a long series of judgments all alike; *e.g.*, exposures 5 to 11, they became uneasy and forsook judgment for guessing.

8. Superficial analogies versus true relationships. Various superficial relationships influenced judgment, depending upon the length of the statement or the location of the plus and minus signs. It should be noted that by a matter of chance, judgments resting upon superficial analogy may also be true. The following examples are typical illustrations:

$A - C$  is larger than  $B - C$ . Must be equal because one subtracts in each case.

$A + D$  equals  $A + C$ . True because one adds in each case.

$A - C + B$  is larger than  $B + A$ . (a) True because there are more letters in the left-hand group. (b) Or, not true, because a letter is subtracted from the left-hand group. (c) Or, true, because a letter is subtracted leaving the same number on each side.

$A + B$  is larger than  $D$ . True, because there are more letters in the left-hand member. In short, the mere presence of a plus or minus sign, or the mere visual effect of balance or lack of balance of the members of the statement, or mere counting of the letters on both sides and comparing, may constitute the determining factor in the judgment. This form of solution was more pronounced with the younger children, and in the norm group. However, it was a factor with certain subjects in all of the groups, and was reported over and over as the solution arising with the first impression from the exposure card.

9. The superior performance was marked by one or more of the following characteristics: (a) elimination of superficial analogies; (b) by certain processes of generalization (No. 5); (c) a critical attitude towards solution, with an appreciation of possible error or of an element of superficial analogy, etc., in making a decision; (d) quickness in eliminating a common factor and in simplifying expressions (No. 6).

## RELATIVE VALUES

## Tabulation A

Age	Norm					Superior			
	No. of Sub-jects	% Correct		Time, Sec. per Exposure		% Correct		Time, Sec. per Exposure	
		Av.	Med.	Av.	Med.	Av.	Med.	Av.	Med.
6						.....	.....	....	.....
7						55	(1)	16.8	
8						60	(1)	11.2	
9						60	60	7.1	8
10						55	65	8.6	9.4
11	50*	26	25	21.18	23.06	67.5	(1)	8.2	
12	41	42	40	16.08	15.16	71.6	70	9.5	8.8
13	46	58	60	12.02	11.51	71.2	70	11.8	14.4
14	28	65	60	9.55	10.04	77.7	75	11.5	10.3
15	22	74	72.5	9.41	10.12	85.6	87.5	12.9	9.6
16	24	79	77.5	9.11	9.26				
17	50	83	80	8.04	8.18				
18	50	84	85	8.19	8.13				

\*25% of the 11 year norm group failed to perform the test.

Only one 7 year superior performed the test; two of the 8 year and two 11 year superiors performed the test.

## INDEX OF SUBJECTS—Tabulation A (Case Descriptions)

Case	Age	Mental Age	Advance	I. Q.	Grade in School	Sex	Binet Age	Chron. Age
VI	A- 6- 5	11	4-7	172.9	4 A ex. Arith	F	2b†	3a†
VII	A- 6- 8	10-8	4	160	3 A	M	2b	2a
	B- 6- 9	11-2	4-5	165.4	2 A	F	4b	1a
	C- 7	11-6	4-6	164.3	2 A	F	4b	0
	D- 7	9-5	2-5	134.5	½ Term Montessori	F	..	..
	E- 7- 2	12	4-10	167.4	3 B	M	4b	1a
	F- 7- 2	11-6	4-4	160.5	3 A	F	3b	1a
	G- 7- 3	9-11	2-8	136.8	5	M	1a†	3a
VIII	A- 8	16	8	200	5 A	M	6b	2a
	B- 8- 2	12-6	4-4	153	4 B	M	3b	1a
	C- 8- 6	13-1	4-7	153.9	5 A	M	3b	2a
IX	A- 8-11	13-6	4-7	151.4	4 A	F	4b	0
	B- 9- 3	14-6	5-3	156.8	5 A	M	4b	1a
	C- 9- 4	15-6	6-2	166	4 A	M	6b	0
	D- 9- 3	12-4	3-1	133	F A O.R.	F	2b	1a
X	A- 9-10	14-11	5-1	151.7	5 A	M	4b	0
	B-10- 1	15-5	5-4	152.9	5 A	M	5b	0
	C-10- 1	17-8	2-7	175.2	6 A	M	6b	1a
	D-10- 2	11-8	1-6	114.3	6 A	F	1b	1a
	E- 9-10	14-1	4-3	153.2	7 A	M	2b	2a
XI	A-11- 3	14-2	2-11	125.9	6 A O.R.	F	3b	0
	B-11- 3	16-10	5-7	149.6	8 A	M	4b	2a
XII	A-11- 9	18-6	6-9	157.4	12 A	M	1b	5a
	B-12- 1	18-6	6-5	153.1	7 A	F	6b	0
	C-12- 2	16-8	4-6	136.9	7 A	M	4b	0
	D-12- 3	18-1	5-10	147.6	8 A	F	5b	1a
	E-12- 4	18-6	6-7	150	10 B	M	3b	3a
	F-12- 3	16-10	4-7	137.4	8 A	F	4b	1a
XIII	A-12- 7	14-8	2-1	116.6	8 A	F	1b	1a
	B-12- 8	15-10	3-2	125	12 A	M	2a	5a
	C-12- 9	18-1	5-4	141.8	9 B	F	4b	2a
	D-13- 6	18-6	5	137	9 A	M	4b	1a
	E-13- 6	19	5-6	147	9 A*	F	5b	1a
	F-12-10	17	4-2	132.5	9 A	M	3b	2a
	G-13- 3	17-7	4-4	132.7	9 A	M	3b	1a
	H-13- 6	18-4	4-10	135.8	9 A	F	4b	1a
XIV	A-13-10	18	4-2	131	9 A	M	4b†	1a†
	B-13-11	18-6	4-7	132.9	8 A	M	5b	0
	C-13-11	16-10	2-11	121	8 A	F	3b	0
	D-14	18-7	4-7	132.7	10 B	M	3b	1a
	E-14- 1	18-7	4-6	132	11 B	M	2b	2a
	F-14- 3	17-7	3-4	123.4	9 A	M	3b	0
	G-14- 4	18-7	4-3	129.6	9 A	F	4b	0
	H-14- 4	18-6	4-2	129	9 A	F	4b	0
	I-14- 6	17-6	3	120.7	9 A	M	3b	0
XV	A-14- 9	18	3-3	122	9 A	M	4b	0
	B-14-10	18-1	3-3	121.9	9 A	M	4b	0
	C-14-11	18-6	3-7	124	11 A	M	2b	2a
	D-15	19-2	4-2	127.8	9 B	M	5b	1b†
	E-15	19-6	4-6	130	11 A	M	3b	1a
	F-15- 5	19-6	4-1	126.5	9 A	F	5b	1b
	G-15- 6	19	3-6	122.6	11 B	M	3b	1b
	H-15- 1	17-2	2-1	113.8	0 B	M	3b	1b

O. R. Opportunity Room.

\* Left school at this time temporarily.

† a = grade in school above Binet Age or Chronological Age.

b = grade in school below Binet Age or Chronological Age.



## CASE DESCRIPTION

### Outline of Case Discussion

- | Case | Sex | Characterizing phrase |
|------|-----|-----------------------|
|------|-----|-----------------------|
1. Personal history.  
Height, Weight, General appearance.  
Early development.  
History of health, disease, and defect.  
Character and temperament. Ideals, ideas, views, preference.
  2. Heredity. Family history.
  3. Home conditions and education.
  4. School records. Estimates of private teachers.
  5. Digest of Binet Tests. Ch. Age. Binet Age. Years in Adv. I. Q. Grade. Etc.  
Conspicuous factors in the Binet scores: Memory. Information. Linguistic and verbal ability. Vocabulary. Ingenuity. Reasoning ability.
  6. Tests in order. Discussing:  
Conspicuous scores.  
Characteristics in procedures and methods of work.  
Comparison with norm group, or others in superior group.  
Significant introspections or psychologizings.  
(Tests: Sim. Addition. Opposites. Part-Whole. Genus-Species. Binet Letter-Square. Substitution. Directions. Trabue. Analogies. Marble Statue. Proverbs. Relative Values. Construction Puzzles. Squares.)
  7. Summary of the Tests. Rank-orders: Ch. Age. Binet Binet Tests.  
Other significant rank-orders. Rank-order average. Distinguishing characteristics.
  8. Summary of the case.

## CASE DESCRIPTIONS

Space forbids the insertion of more than a few illustrative cases. Those presented are representative of the different types. The case descriptions are compiled from the social histories, Binet Tests and Psychological Tests (Tabulations I, II, III, IV, and V, Appendix, and the various tabulations accompanying the various psychological tests). *Brevity has necessitated blunt statements in which complete sentence structure has been omitted where the meaning is clear.* In comparing the individual with the norm and superior scores, the experimenter has sought to get concise approximations. This has often necessitated the ignoring of fine distinctions. Accuracy and speed in the individual case have often been so different from the averages in a particular group, that judgment in such cases has been more or less an arbitrary matter.

Introspections and psychologizings. The introspections, or better, psychologizings of the children are included in the case descriptions wherever they seem to offer an explanation of the procedure in a particular test or throw light on the attitude of the subject.

Social, health, and school data. The essential facts of health, school, and social data were usually secured. Los Angeles has such a shifting population that it is seldom that a complete record is procurable. The reports of parents (unless they have kept baby books) are very inaccurate, and outside of some event sharply defining a certain date, the replies are little more than rough approximations. Dates of walking and talking are hard to locate. Much that the experimenter has gained from teachers and from incidental and neighborhood sources has led him to look upon the reports of parents with considerable doubt. *Der Bericht* and *das Verhör* of the fond parents needs to be added to the rich literature of *die Aussage*.

## CASE VI A. Female

(A receptive child with a very unusual early training in reading.)

*Personal history.* Height 3 ft. 10.5 in. Weight 50. VI A is an

ordinary looking child, muscles somewhat flabby, somewhat anemic. Early history normal but for pneumonia and considerable "stomach trouble."

*Character and temperament.* Mother reports: quiet, sensitive, and very conscientious. Appears somewhat nervous, and has a rather meaningless giggle.

*Ideals, etc.* Chief interests are study and reading. Reads stories of travel. Only amusement, paper dolls. On the whole a rather colorless child, but possessing shrewdness and a good memory. Mother says she must be a leader at play or will not play at all.

*Heredity.* Mixed American. Father and mother teachers, and trained in a normal school. Maternal grandfather minister. Nothing further to be noted. No evidences of superiority from ancestry. However, the traditions of the home are good: clean, honest, strictly religious.

*Home conditions.* Clean, inartistic, mediocre. Nothing objectionable, and yet nothing cultural about it. Much of the stern religious attitude. *The child is thoroughly imbued with a desire to excel in academic performance. This is a reflection of the mother's highest ambition.*

*Home education.* The mother has worked out a system of reading by which she used plays and games. She has established a small class of children, about primary age or younger. The children undoubtedly are taught to read very quickly and intelligently. Great care seems to have been taken to develop a rich concept for the various words encountered. The mother is writing a series of readers and her whole interest has been to have her daughter an example of the merits of her method. The secret of the matter seems to be that the child has been kept at work from about 2½ years of age. Subject undoubtedly has a splendid memory, and is also precocious. It must not be forgotten also that the mother has constantly tried to give real, concrete meaning to the words. The child reads as well as the average eleven-year-old child. Dissected pictures and maps were used in geography. She has been to the movies a few times. Has rats and prefers them to dolls. Reads constantly—newspapers and story books.

Has not attended school. A 4 except in arithmetic.

*Binet Tests.* Ch. Age, 6-5. Binet age, 11. Years in advance, 4-7. I. Q. 172.7. Performs all tests through Year X. In Year XII, the Ball and Field, Dissected Sentences, Interpretation of Pictures, and Similarities are performed correctly. Many of these tests easily relate to reading and vocabulary, but others, as the Ball and Field, Designs, and the Weights, can hardly be accounted for in such a way. The Ball and Field was performed in one of the superior ways and without hesitation. The Weights (Year IX, 2) were arranged methodically, and then all retested before considering the problem finished. The total time for the Dissected Sentences



(Year XII) was 47 seconds; performed apparently without effort. In the Interpretation of Pictures (XII, 7) each was very aptly captioned or explained. On the whole, it seems just to say that the superior performance of the Binet Test is in part due to reading ability and rich concepts, and in part to superior ability, and in part to a very splendid memory and verbal fluency. The very strict training in reading from about the age of  $2\frac{1}{2}$  is probably the most important single factor in VI A's superiority. The mother has developed a system of "observational noting" which could legitimately raise the issue as to whether transfer of training is not responsible for the systematic procedure in the Ball and Field and the Weights Tests.

*Tests in order.* Sim. Add.: not performed. Association tests; score roughly that of an 8 year old child (norm group), a lower score than one would anticipate judging from superior verbal fluency. Binet Letter-Square: score 99, a little below average for 8 year old (norm group), and below the 7 year average (superior group). Substitution: only first half of sheet I performed. Test proved too laborious and was given up. Fatigue of hand played an important part. Lack of hand-motor and clerical precision in sharp contrast to reading ability. Whole procedure, both time and accuracy in recall (accuracy 45%), are sharply below the average for 9 year (norm group). Directions Test: time scores near those of a 12 year old child, accuracy scores near those of an 11 year old child (norm groups in each case). Trabue Tests: score in B, 15, score in C, 10, which places VI A on a par with a Trabue norm for 15 year group and 10 year group respectively. Analogies: test A, time score 4.8 (about 12 year norm group), errors 1 (about 17 year norm group); test C, errors too many (16) to make comparison possible. Marble Statue: score 34, about on a par with 11 year norm group. Proverbs: (only the first two performed), probably about on a par with the performance of an 8 year norm group. Construction Puzzles: A test, moves 57, time 3:22, with trial and error method; on repetition, procedure seems to be learned, but the time is slow (17 sec.). This performance is distinctly below the 7 year norm group. In the B test the small pieces were eliminated first and carefully judged as to size; moves 17, time 46 sec. Both time and moves scores are decidedly better than the 12 year norm group. VI A has had considerable practice with dissected maps. Relative Values: not performed. Imagery: visual and kinaesthetic-verbal, with recall directly through imagery and with little use of logical, associative, or mnemonic devices.

*Rank orders.* Ch. age, 1; Binet tests 4; rank-order average, 3.5. Distinctly high rank-orders: Genus-Species (7), Marble Statue (17), Trabue (17.5). Considering the specializing in reading, the Vocabulary rank-order is surprisingly low, 3.5. Summary: Case VI A makes comparable scores in the Binet and the Psychological

tests. In the latter tests, a comparison with the norm-group show her to be about on a par with the 11 year group. Her conspicuous high rank-orders are with the Marble Statue and the Trabue tests, both directly dependent upon verbal fluency and reading ability. The tests she failed in (Substitution, Sim. Addition, and Relative Values) are nearly independent of reading and verbal fluency.

*Summary of case.* Health conditions rather against. Home, economic conditions, culture, and rational training mediocre. A very early, severe, and thorough training in reading, which has been specialized at the expense of everything else. There is evidence, however, of a certain superiority in memory, mental alertness, learning adjustments. Making all allowance for this, the Binet score and I. Q. appear to be enormously inflated by the abnormal training in reading and its correlaries, verbal fluency and a certain academic adaptability and docility.

#### CASE VIII A. Male

(Very precocious. Excellently trained.)

*Personal history.* Height 4 ft. Weight 59. Nervous and somewhat anemic appearing (very slight). Early history, normal. Has never been ill(?) (mother Christian Scientist). Child somewhat irascible.

*Character and temperament.* Not particularly agreeable in manner. No particular religious views. Chief interest, games and reading. Seems fairly obedient, except for a certain resentful attitude. Fond of animals and flowers. Is highly individualistic and petulant.

*Heredity.* Mixed American; English predominating. Father and mother high school graduates. Father railroad engineer. Has two aunts (maternal) who hold prominent places in the public schools. Mother and aunt seem exceptionally alert, intelligent, and of dominating personality.

*Home conditions.* Live in modest bungalow on a good street. Everything in good taste, and even artistic. Comforts, but few luxuries. Both mother and aunt are Christian Scientists. The aunt who has guided the education seems a rare combination; her educational ideas are a happy union of radical, commonsense, and practical factors. Sanitary conditions and habits seem good. The chief unfavorable element is the very nervous temperament of all three. They undoubtedly mutually irritate each other.

*Home education.* Child learned multiplication and reading at home. Goes to Sunday School. Taught simple moral duties. Has language and educational games. Reads "Popular Mechanics," "John Martin's Book," "Something To Do," "Little Folks." Also "Home Geography for Primary Grades," Harper's "Beginning Electricity." Has read "Young Folks Cyclopedia of Common Things,"



(Year XII) was 47 seconds; performed apparently without effort. In the Interpretation of Pictures (XII, 7) each was very aptly captioned or explained. On the whole, it seems just to say that the superior performance of the Binet Test is in part due to reading ability and rich concepts, and in part to superior ability, and in part to a very splendid memory and verbal fluency. The very strict training in reading from about the age of  $2\frac{1}{2}$  is probably the most important single factor in VI A's superiority. The mother has developed a system of "observational noting" which could legitimately raise the issue as to whether transfer of training is not responsible for the systematic procedure in the Ball and Field and the Weights Tests.

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*Home conditions.* Live in modest bungalow on a good street. Everything in good taste, and even artistic. Comforts, but few luxuries. Both mother and aunt are Christian Scientists. The aunt who has guided the education seems a rare combination; her educational ideas are a happy union of radical, commonsense, and practical factors. Sanitary conditions and habits seem good. The chief unfavorable element is the very nervous temperament of all three. They undoubtedly mutually irritate each other.

*Home education.* Child learned multiplication and reading at home. Goes to Sunday School. Taught simple moral duties. Has language and educational games. Reads "Popular Mechanics," "John Martin's Book," "Something To Do," "Little Folks." Also "Home Geography for Primary Grades," Harper's "Beginning Electricity." Has read "Young Folks Cyclopedia of Common Things,"

over and over. He has an unusual range of information which is probably largely due to his book. Cleans teeth regularly.

The following is a letter from the aunt describing his home education.

"At the age of three he learned his letters untaught by any one apparently and was spelling words. It was felt that this would interfere with his learning to read later on, so he was taught to read by the phonics method. This was done with no more time and personal attention than any first grade teacher, with ordinary number of pupils, could give to each one, provided she were generously supplied with different books and not limited to one or two sets—State series or otherwise. A few months after his fourth birthday he was reading with independence and an almost perfect power to recognize new words. His only noticed failures were such foreign words as 'Chevrolet' seen on bill boards, and unusual words like 'aisle' used without context which he pronounced 'alicie.' His ease in reading was, of course, made possible, or at least greatly facilitated, by the fact that an effort had always been made to use an extended vocabulary in talking to him. Even at two he would surprise acquaintances and strangers with expressions which meant not greater effort to him than a child's baby talk; such as "Oh, the spider has *attached* his web to the board."

This ability to read opened a new world—for he read car signs, bill boards, newspapers, magazines, and books. His books and magazines were carefully selected. His access to newspapers, especially the funny sheets, had the most questionable results. But 'The Child's Garden of Verses' and others proved a veritable dream-world—as real as the every-day ones. He once asked his mother: 'Does Robert Louis Stevenson know when I'm naughty?' At another time he wrote a letter to some of the characters in another book. At the age of six he read 'Swiss Family Robinson'—and Champlin's 'Young Folks' Cyclopedia of Common Things'—the two books which have been and still are his favorites. Other books which he read before entering school at seven years were: Overall Boys, Brownie Book, Kipling's Just So Stories (read over and over and over for two or three years), Swift's Gulliver's Travels, Kingsley's Heroes, Aesop's Fables, Tolstoy's Stories for Children, Grimm's Fairy Tales, Arabian Nights, Barrie's Peter Pan and Peter and Wendy.

He entered school at seven and a half years and was put in the B1 (beginners') class. In the two days he was kept here he developed a distinct aversion to school since nobody discovered he could do anything and the close confinement and need for sitting still (coupled with the fact that he did not find the toilet for over a week), made school most disagreeable to him. On the third day, a member of the family intervened and the teacher very reluctantly allowed him to enter the second grade. She insisted that he could not do the work as he did not know his sounds. Of course he did



'know his sounds' but perhaps he refused to do such baby work although he never expressed his unwillingness at home and seemed quite afraid of displeasing his teacher. In the second grade he was forced to sit for 20 or 25 minutes studying a reading lesson out of a book which he could have read through in that time. At home he was told to take some book to school, but the teacher refused to let him read in school, even the Cyclopedia of Common Things. At the end of a week and a half he was in absolute rebellion and was taken out of school. A teacher of the fourth grade who knew him was consulted and asked to examine him for proper placement. At her suggestion the principal of his school was appealed to and he was placed in the A4 class under a most sympathetic, patient, and 'understanding' teacher, who, however, left before the end of the term. In February he skipped a year, entering the A5. In this first year at school he had thirteen teachers, including those for special subjects as music, sloyd, nature study. etc. His previous aversion to school lessened, but he does not today express any great joy in attending."

*In summary:* the chief factors of home education seem to be definite and thorough training in reading, and an attempt to build out child's vocabulary. This is combined with an excellent selection of books. The child has associated with educated, serious-minded adults.

*School records.* In A5. E in language, reading, arithmetic, spelling, in manual training. G in drawing. F in writing. In grades 1, 2, 3, 4, 5 for short periods, all in one year. He likes manual work best. His present teacher considers him very brilliant. Plays normally. In Gray's "Standardized Reading Paragraphs" he scores 63.75. The average of A5 class is 48.

*Binet Tests.* Ch. age, 8; Binet age 16. Years in advance, 8. I. Q., 200. Does all tests through XII year without fail, usually with speed and aptness of reply. In the XIV year he does Vocabulary (61), Induction, Arith. Reasoning, and Clock, and A1, Repeats 7 Digits. In XVI year, does Interpretation of Fables (excellent), Problem of the Enclosed Boxes, 6 Digits Backwards, Code. In XVIII year, Repeats 8 Digits, Repeats thought of, (one) passage. The extremely high score seems to rest on general all-round good procedure, reasoning ability, reading ability, very quick response, and unusual memory for digits. Digits scores gives him 11 added months in the XVI and XVIII year tests. He is the only superior subject below 12 years to perform the 8 Digits. He is also the only child below 9 years superior to perform the Code Test.

*Tests in order.* Sim. Add.: on a par with 12 year superior and 18 year norm group. A very remarkable performance in sustained and distributed attention. Performed with considerable ease. Association tests: on a par with 15 norm group, and somewhat inferior to 11 year superiors. Binet Letter-Square: on a par with 16 year norm, and somewhat inferior to 11 year superiors. Substitution:



superior to 8 year superiors, and also to 9 year norm. However, had to use key-card on the recall sheet, and the performance is relatively poor. Directions: about on par with 11 superiors, and 16 year norm, Trabue: on par with 11 norm and 7 superior. Relatively a poor performance. Some of the blanks are very poorly filled, which is surprising in the face of exceptional linguistic and reading ability. Analogies: A test, on par with 18 year norm group and about 12 year superior. B test, on a par with 11 year norm in speed and much superior in accuracy; about on par with 10 year superior. C test, on a par with 18 year norm in speed, but hardly comparable due to very great inaccuracy of subject (11 errors); on a par with 10 year superiors in speed, but inferior in accuracy. Marble Statue: on a par with adult norm and 8 year superior. Proverbs: about on a par with 8 year superior, and 9 year norm group. Relative Values: about on a par with 13 norm, and inferior in accuracy and superior in speed to the other 8 year superiors taking the test. Construction Puzzles: A test, on a par with 12 year norm in time and superior as regards number of moves, about on par with 8 year superiors. B test, much superior in time and moves to 12 year norm, and about on par with 8 year superiors. Seems to be splendid visual, verbal, and auditory imagery. Rank-orders: Ch. age, 9; Binet age, 22; rank-order average, 15. Summary: subject tends to rank on a par with 12 to adult in the norm group, and about 10 years superior group.

*Summary of case.* Heredity commonplace, but both mother and maternal aunt have vitality, originality, and personality. A very happy combination of incidental reading with a judicious use of a reading method seems to be the chief home education factor. To this must be added a rich development of vocabulary with much attention to the content of words used. The very exceptional response in a wide range of tests not particularly affected by training shows that the subject has a sustained, well distributed attention, a good visual and also kinaesthetic-verbal (and auditory) memory, a very quick associative response, and a resourcefulness in new situations. While the type of training, and the association with the aunt has been conducive to a good academic performance, there seems to be ample ground for a belief in an unusually alert and precocious mentality.

#### CASE XII A. Male

(Typical child prodigy. Subjected to strict educational discipline from the first.)

*Personal history.* Height 4 ft. 8 in. Weight 78. A fine looking healthy boy. Early development precocious. Has had no disease outside of croup and whooping-cough.

*Character and temperament.* Quick tempered, forgives easily,

talkative, vivacious, and somewhat artificial and self-conscious. Interests are extremely varied. Desires to enter many different occupations.

*Heredity.* Mixed American. Father and mother both college graduates, mother holds A. M. degree. Father a minister and mother a teacher. Maternal grandfather a physician. Uncle on father's side a minister and father of cases VII G and X D. (Was never able to get a family history from either brother.) Mother is a very nervous, energetic, ambitious woman, placing very great value upon academic training. Father seems to be a good-natured, easy-going man, rather heavy mentally.

*Home conditions.* As both father and mother work, the home is reduced to a flat. Conditions are good and location is opposite a fine park. The home is not artistic or luxurious but very comfortable. The culture is of the religious and literary type, and in no sense of the modern critical, radical or scientific sort. On the whole, the family is fairly well steeped in tradition and places very great value upon appearances. As regards education, however, the mother has shown much boldness, has defied traditions, and *has shown almost superhuman energy and persistence in carrying out her ideas of training.*

*Home education.* Of all of the cases, no other subject has been subjected to such strict and thorough regimen. In completeness of plan and definiteness of ideas of education, the procedure of the mother has been comparable to that of Mrs. Stoner in the education of Winifred. Knew capitals and small letters before 1½ years of age. Read at 2½. The plan has been to teach incidentally, but to present the desired material as plays and games. The mother has attempted to give a well-balanced and varied education. Child has been taught to swim and row. Belongs to the boy scouts. Does not succeed at baseball. Has been given physical training and has taken definite training in the Y. M. C. A. Has had a strict sanitary training. The plan of education in general has been to throw the child upon his own resources and to emphasize cause and effect conditions. There has been little formal training. The child sings and whistles very well indeed. Has been encouraged from a baby to express his ideas in pictures. Has had a large number of plays and games and the mother has done much of her teaching by inventing games and plays. Has some knowledge of machinery. Reads English, French, and Spanish. Reads all of the current magazines, especially "Current Opinion," "Century," "Popular Science Monthly," and "Youth's Companion." Has read nearly all of the list of Uniform Requirements in English of the Report of the National Conference on the Uniform Entrance Requirements in English. The mother has a definite plan for reading a book first read through hurriedly and then reread more intensely. Reads two books a week from the library. He has written several stories.



superior to 8 year superiors, and also to 9 year norm. However, had to use key-card on the recall sheet, and the performance is relatively poor. Directions: about on par with 11 superiors, and 16 year norm, Trabue: on par with 11 norm and 7 superior. Relatively a poor performance. Some of the blanks are very poorly filled, which is surprising in the face of exceptional linguistic and reading ability. Analogies: A test, on par with 18 year norm group and about 12 year superior. B test, on a par with 11 year norm in speed and much superior in accuracy; about on par with 10 year superior. C test, on a par with 18 year norm in speed, but hardly comparable due to very great inaccuracy of subject (11 errors); on a par with 10 year superiors in speed, but inferior in accuracy. Marble Statue: on a par with adult norm and 8 year superior. Proverbs: about on a par with 8 year superior, and 9 year norm group. Relative Values: about on a par with 13 norm, and inferior in accuracy and superior in speed to the other 8 year superiors taking the test. Construction Puzzles: A test, on a par with 12 year norm in time and superior as regards number of moves, about on par with 8 year superiors. B test, much superior in time and moves to 12 year norm, and about on par with 8 year superiors. Seems to be splendid visual, verbal, and auditory imagery. Rank-orders: Ch. age, 9; Binet age, 22; rank-order average, 15. Summary: subject tends to rank on a par with 12 to adult in the norm group, and about 10 years superior group.

*Summary of case.* Heredity commonplace, but both mother and maternal aunt have vitality, originality, and personality. A very happy combination of incidental reading with a judicious use of a reading method seems to be the chief home education factor. To this must be added a rich development of vocabulary with much attention to the content of words used. The very exceptional response in a wide range of tests not particularly affected by training shows that the subject has a sustained, well distributed attention, a good visual and also kinaesthetic-verbal (and auditory) memory, a very quick associative response, and a resourcefulness in new situations. While the type of training, and the association with the aunt has been conducive to a good academic performance, there seems to be ample ground for a belief in an unusually alert and precocious mentality.

#### CASE XII A. Male

(Typical child prodigy. Subjected to strict educational discipline from the first.)

*Personal history.* Height 4 ft. 8 in. Weight 78. A fine looking healthy boy. Early development precocious. Has had no disease outside of croup and whooping-cough.

*Character and temperament.* Quick tempered, forgives easily,



talkative, vivacious, and somewhat artificial and self-conscious. Interests are extremely varied. Desires to enter many different occupations.

*Heredity.* Mixed American. Father and mother both college graduates, mother holds A. M. degree. Father a minister and mother a teacher. Maternal grandfather a physician. Uncle on father's side a minister and father of cases VII G and X D. (Was never able to get a family history from either brother.) Mother is a very nervous, energetic, ambitious woman, placing very great value upon academic training. Father seems to be a good-natured, easy-going man, rather heavy mentally.

*Home conditions.* As both father and mother work, the home is reduced to a flat. Conditions are good and location is opposite a fine park. The home is not artistic or luxurious but very comfortable. The culture is of the religious and literary type, and in no sense of the modern critical, radical or scientific sort. On the whole, the family is fairly well steeped in tradition and places very great value upon appearances. As regards education, however, the mother has shown much boldness, has defied traditions, and *has shown almost superhuman energy and persistence in carrying out her ideas of training.*

*Home education.* Of all of the cases, no other subject has been subjected to such strict and thorough regimen. In completeness of plan and definiteness of ideas of education, the procedure of the mother has been comparable to that of Mrs. Stoner in the education of Winifred. Knew capitals and small letters before 1½ years of age. Read at 2½. The plan has been to teach incidentally, but to present the desired material as plays and games. The mother has attempted to give a well-balanced and varied education. Child has been taught to swim and row. Belongs to the boy scouts. Does not succeed at baseball. Has been given physical training and has taken definite training in the Y. M. C. A. Has had a strict sanitary training. The plan of education in general has been to throw the child upon his own resources and to emphasize cause and effect conditions. There has been little formal training. The child sings and whistles very well indeed. Has been encouraged from a baby to express his ideas in pictures. Has had a large number of plays and games and the mother has done much of her teaching by inventing games and plays. Has some knowledge of machinery. Reads English, French, and Spanish. Reads all of the current magazines, especially "Current Opinion," "Century," "Popular Science Monthly," and "Youth's Companion." Has read nearly all of the list of Uniform Requirements in English of the Report of the National Conference on the Uniform Entrance Requirements in English. The mother has a definite plan for reading a book first read through hurriedly and then reread more intensely. Reads two books a week from the library. He has written several stories.

Contributed an article to "St. Nicholas" at 7 years and received a silver medal. At 6 years received \$7 for a story from "Woman's Home Companion." Mother has gone through every phase of incidental and general science. Special pains have been taken to inculcate a love for plants and animals. Child has had pet dogs, cats, rabbits, etc. Mother claims that the subject is not above normal but merely an ordinary child with whom every moment has been utilized profitably.

*Physical conditions.* Having in mind the oft-repeated statement that precocious children have their health undermined, the mother kept a record of the height, weight and vital capacity. Takes 8th year for example; the subject is about the average height (a little over); weight some 7 pounds above the average; in vital capacity far superior to the 9 year norms. There seems to have been no undermining of the child's health.

*School records.* In A12. Subject completed the grammar grade work at home and entered High School at 8 years of age. His high school records are not very good, in fact, there has been much difficulty in making passing grades according to the teachers and records. On the other hand, the mother thinks the teachers have failed to make the allowances they should have in the case of a child not subjected to the formality of school until so late. Teachers feel that the child has been "stuffed" and is neither unusually bright nor properly taught. At the present time the subject is taking a business course at the Y. M. C. A. Typewrites fairly well.

*Binet Tests.* Ch. age, 11-9; Binet age, 18-6. Years in advance, 6-9. I. Q., 157.4. Performs all of the tests except Repeat 8 Digits, and Repeat 7 Digits Backwards. Vocabulary 84 words, definitions very good and very unusual in choice of words. Throughout, his procedure is exceedingly quick and very adult in character both in replies and in the side comments. Very critical as to the accuracy of his own performance. In the Ball and Field test he proposed four different ways of exploring the field. In the Clock test notes the discrepancy in the position of the hands.

*Tests in order.* Sim. Addition: slightly inferior to 14 norm and slightly surpasses 11 superior. Directions tests: surpasses decidedly the norms for any of the norm or superior groups. Binet Letter-Square surpasses by far any norm score and is on a par with 14 superior. Imagery decidedly visual. Substitution: about on a par with 16 norm and about on a par with 12 superior. Directions: on a par with 16 norm and 15 superior. Trabue: between 15 and 16 years norm, and on a par with 15 superior. Analogies: Test A, on a par with 15 norm and about 11 superior. B test, about on a par with 18 norm, and 12 superior. C test, superior to 18 norm and 15 superior. Marble Statue: on a par with adult norm, 14 superior. Proverbs: on a par with adult norm, 15 superior. Relative Values: inferior to 15 norm, and slightly inferior to 12 superior. Construc-



tion Puzzles: A test, much superior to 12 norm in both speed and moves (but 5 moves were required). About on par with 12 superior. B test, the performance here was not good, 39 moves, and time 98 seconds. Very difficult to compare, the number of moves greater than that required for any of the norm or superior groups. Rank-orders: Cr. age, 23; Binet age, 42.5; rank-order average, 42. Imagery: mixed, strong visual and auditory; considerable use of mnemonic and associative devices as well. Summary: the tests indicate superiority along all lines of testing. The weakest procedure is with the construction boards.

*Summary of case.* Heredity good, home good. Home training and education very unique, the mother giving constant care and attention to a definitely planned program including both subject matter and methods of study. Making due allowances for all this, the particularly excellent responses on tests are not wholly accounted for by training.

### CASE XIII A. Female

(Musical "prodigy." Comparatively low Binet score.)

*Personal history.* Height 4 ft. 6 in. Weight 72. Early development normal.

*Character and temperament.* Very temperamental, vivacious, full of energy, quick in speech, egotistical, self-centered, gesticulates impulsively and makes decisions quickly and with finality. Very individualistic, unique in speech and action but not queer in either action or dress. On the whole her individuality is refreshing and her egotism rather amusing. Has attracted much attention in her public performances on the piano. Undoubtedly has very superior ability and many predict a wonderful career for her; this remains to be seen. Subject quite sophisticated; dictates to her family who adore. Has no interest in school, or amusements. Practices incessantly. However, (family large) this is combined with much information and interest in the most superficial matters of small talk and movies. Rather "slangy."

*Heredity.* No records secured. (Mother very secretive and could not get answers.) Russian Jews. Sister musical, in Metropolitan Opera Company (probably small part). Father and brother tailors. Family very coarse, clever, suspicious, commercial minded. Talk incessantly of the money value of the subject's talent. Six children.

*Home conditions.* Live in Jewish section of city. Small bungalow, rather dirty, disorderly, and ill-kept. Considerable money spent in tawdry decorations and "works of art." Sanitary conditions below average. All poorly groomed and manicured. Subject's teeth uncleaned. Family look upon subject as a "wonder-child." Whole family coarse and uncultured and uneducated, but of great vitality, ambition, and probably ability.



*Home education.* Has depended upon the school. In music, family pride, hope, and united effort have backed the education. A grand piano has been purchased, and money has been found for expensive teachers. Spends several hours a day in practice and school is entirely secondary.

*School records.* In A8. Only average student, and frankly admits no interest outside of her music. Relatively poor in arithmetic and educational habits. It must be kept in mind that subject has no desire to excel in school work.

*Binet Tests.* Ch. age. 12-7. Binet age, 14-8. Years in advance, 2-1. I. Q., 116.6. In XII year, failed in the Ball and Field test, Vocabulary falls in this year being 46 (comparatively a low vocabulary for a superior. In XIV year, fails in Vocabulary, Induction, President and King, and Problems of Fact. Performs Arithmetical Reasoning, Clock. XVI year, performs Problems of Enclosed Boxes, Repeats 6 Digits Backwards, and Code. In the Code test the methods consists in going back to "a" in each case and running through the alphabet in groups of three letters. The time, 2:43, is very quick considering the method. In the XVIII year, does Binet Paper Cutting and Repeat 8 Digits. The performance on the whole is, in terms of I. Q., the poorest of any of the superiors. The tests requiring vivid imagery and puzzle solving ability are performed best—Clock, Arithmetical Reasoning, Problem of Enclosed Boxes, Binet Paper Cutting and Repeat 8 Digits. Vocabulary tests and tests requiring verbal fluency, refined meanings, abstract judgment and interpretation are performed most poorly. The question may be asked: To what extent has the nature of the home life and the exclusive interest in the piano brought this about? It should be noted that in the Arithmetical Reasoning the answer was secured very quickly by trial; thus,  $12 \times 6$ ;  $24 \times 6$ ;  $48 \times 6$ ; finally  $50 \times 6$ .

*Tests in order.* Sim. Addition: score, 240, far superior to any norm or superior average. This test requires ability in the distribution of attention in a sustained, continuous, rapid performance. Is the condition somewhat akin to the demands in piano playing? Performed with ease. Association: on a par with 18 norm and 14 superior. Binet Letter-Square: superior to all norm averages and a little inferior to 12 superior. Substitutions: on a par with 16 norm and about on a par with 13 superior. Directions: about on a par with 16 norm and 10 superior. Trabue: on a par with 10 norm and inferior to 7 superior. Note the very inferior performance. Again a linguistic and ingenuity situation. As the subject has shown superiority in several other ingenuity tests the difficulty is probably with meanings and verbal fluency. Analogies: performance is here similar to the younger subjects namely, a relatively lower performance on the more difficult C test. In tests A and B superior to 14 norm and 10 superior. In test C, on par with 10 norm in speed but inferior in accuracy, and on par with 7 superior. Marble Statue:

on a par with 14 norm and 12 superior. Proverbs: much superior in time and about on a par with 10 norm in accuracy, and inferior to 8 superior. Relative Values: on a par with 14 norm in accuracy and superior in speed, inferior to 12 superior. Construction Puzzles: much superior to 12 year norms in both puzzles. Superior to all superior averages. Imagery: very vivid visual and auditory imagery. Rank orders: Ch. age, 29; Binet age, 17; rank-order average, 22. Summary: in the psychological tests, as in the Binet, shows superiority in the ones demanding vivid imagery and immediate memory, and ingenuity and sustained attention. Inferior in those demanding verbal fluency and linguistic ability.

*Summary of case.* Home below average in every respect, except for ambition, backing and encouragement given the child in her music. Heredity (unknown) evidences of physical and mental vigor. Culture, language, and educational conditions very low. Subject's very great musical ability and her excellent performance in certain tests lead the experimenter to believe her to be of unusual ability but much handicapped by home conditions which have been less influenced than usual by schooling due to the fact that the subject has even while in school, devoted most of her time and all of her interest to music, which may have increased the capacity for distributed attention (transfer of training), for alertness, and sustained effort. *Such a case would seem to indicate the weakness of the Binet tests in estimating a case without careful consideration of the exact nature of home, traditions, ambitions, and training.*

#### CASE XIII B. Male

(Purported musical and intellectual "prodigy.")

*Personal history.* Height 4 ft. 2 in. Weight 69. Undersized and underweight. Small boned, frail, and somewhat stooped and anemic looking. A little retarded in early development. Did not speak until 18 months old but spoke plainly from the first. At five had measles. Very ill kept nails, clothing, teeth, hair. Skin very dirty.

*Character and temperament.* Childish and quick-tempered. Has a very ordinary but cheerful face. Nothing striking or particularly fine looking in appearance. From father's account, is very erratic; goes off early in the morning and may not return until late at night. Some days practices the piano furiously all day, at other times will not play at all (reasons for believing that both parents and child are not strictly truthful). Very willful and disobedient. Very careless in all matters and almost impossible to teach habits. Is very childish in his manner, plays with the smaller children and is typically childish and boyish. This is perhaps due to his size. Has been much talked of in newspapers on account of his precocity in school grade and his remarkable ability at the piano. Wants to be a musician. Spends leisure time in reading. Is decidedly adult in



his tastes. Does not care for movies. Goes to the best concerts—violin, piano, symphony, voice. Wants to perfect himself in piano-forte and then go to college.

*Heredity.* Russian Jew. Father grammar school education—is a printer. Mother 2 years university in Russia—a proof-reader. Paternal grandfather a rabbi. Maternal grandfather high school education—a merchant. An uncle is said to have taken mathematics and Latin prizes four years in succession at a Canadian university.

*Home conditions.* Home average and in an average community, but care, sanitation, decorations, ornaments, etc., very much below the wholesome and artistic. Neither child nor family show evidences of much attention to habits of personal hygiene or health. Father a capable man at his work; exaggerates or is even dishonest in his accounts of the subject's ability and characteristics. Both parents rather well posted in matters of world interest, radical culture, and keen judgment of social conditions, lacking in the social and personal refinements. Mother, especially, is well posted and has a critical attitude of literature that would surpass the majority of college people. The traditions for education are strong, family pride and confidence are enormous. They consider the subject a wonder-child, and claim to have mortgaged their home in order to give him a suitable musical education. English spoken rather poorly by parents. Russian and Yiddish used.

*Home education.* Uncle taught the subject to read and write at three years of age. Knew alphabet from A B C blocks at 1½ years. Used a "spelling machine" and learned to spell and read with the aid of it. At 4 years read simple stories. At 3 years could make change. Has played chess 4 years, and now plays well and often defeats adults. Has no interest in plants or animals. Knows some German. Reads the newspapers and all of the biographies of musicians that he can get hold of, as well as books of criticism and the current musical magazines. He showed an interest in music at 2½ years, would sit for hours under a neighbor's window and listen to the piano. At 9 years of age family secured a piano and subject has taken lessons since of best teachers. Practices from 4 to 6 hours a day. (What the child needs is plenty of out-door life and exercise; having invested in his musical education, the father wishes him to practice constantly.) It must be recalled that in addition to the piano work the child also has attempted an unusual amount of school work. As regards the piano, the subject has some ability, but is not on a par with the other precocious musical children. He gives every appearance of being stuffed and is pedantic in his language.

*School records.* In 12A. Skipped grades 1, 2, 3, 4, 5B and 9B. It requires much judgment and caution to judge of his grades and the estimate of the school. The school tends to judge in objective measurements of work done in class, regardless of the age or the



circumstances. It must be considered remarkable that the subject has kept in the grades at all considering the heavy work demanded at home on the piano, and his very frail body, and his age. His grades in the intermediate high are good, ranging from A— to B—, covering 14 different subjects. Deportment was excellent. In high school the record is not so good. Has failed in A10 Spanish (second time made G and A grades). 11B Algebra failed, repeated, and finally dropped. Eng. B10 (composition) failed, repeated with B grade. Latin, B10, failed, repeated with B grade. Physics D (has not yet repeated). Deportment is now D. The records certainly indicate cramming and increasing difficulty in meeting the grades. Part of this may be due to gaps in education produced by grade skipping, part may be due to the attempt to do too much (including piano practice) and part may be lack of physical vitality and healthy bodily condition. Teachers do not consider him precocious.

*Binet Tests.* Ch. age, 12-8. Binet age, 15-10. Years in advance, 3-2. I. Q., 125. In XIV year, fails in Problem of Fact. In XVI year, fails in Repeat 6 Digits backwards, Code, and A1, 1, a and b, Repeat 28 syllables. In the XVIII year fails in all of the tests except 4, Repeat the Thought of Passage Heard. Vocabulary is 64. He seems peculiarly unable to get the digits tests, failing on all after the XII years. Ability in such tests is not much of a measure of intelligence, but in the Binet tests the subject is penalized (in this case) 17 months. In the case of the vocabulary, the home probably accounts for a certain lack or refinement in meaning. The failure in the Ingenuity, the Binet Paper Cutting and the Code can not be thus accounted for. It is interesting to note in this connection that the subject has never taken any interest in puzzles, and also that his attitude during the tests was devoid of any enthusiastic attempt to perform.

*Tests in order.* Sim. Addition: much superior to any norm and inferior to 13 superior. Association tests: on a par with 14 norm and superior to 10 superior. Binet Letter-Square: score, 333, much superior to any norm or superior average. Uses kin. verbal mostly, but resorts to mnemonic devices, and occasionally remembers one visually. Substitution: superior to 16 norm, and to any superior average. Directions: superior to any norm or superior average as regards time, but about on a par with 14 norm and 9 superior in accuracy. Trabue: on a par with 12 norm and 9 superior. Analogies: perhaps slightly superior to 18 norm and 15 superior. Proverbs: slightly inferior in accuracy and slightly superior in time to 15 norm, and also 12 superior. Relative Values: inferior in accuracy and superior in speed to 15 norm, and about on a par with 13 superior. Construction puzzles: very much inferior in both tests in both speed and number of moves to any norm or superior average. The procedure was trial and error without

much profit, and even a repeated attempt to put the blocks in place was very poor (usually with the superiors the second attempt was performed without effort). Imagery: both visual and kinaesthetic verbal. Visual weak. Difficulty in receiving auditory presentation of materials. Rank-orders: Ch. age, 30; Binet age, 21; rank-order average, 27. Summary: the Construction Puzzles (already indicated in the Binet tests) show a certain inability for puzzle material. Relatively weak in linguistic situations. Relatively, the performance is much superior in the psychological tests to that in the Binet tests.

*Summary of case.* Heredity indicates no marked superiority. Home, its conditions and culture, are below average. Pride, ambition, and willingness to make sacrifice, are enormous. Health and physical development much below normal. An entirely too ambitious program for any child of any age makes judgment difficult. It is one of the most difficult cases to estimate, but in the opinion of the experimenter the subject is but moderately superior.

#### CASE XIV A. Male

(General all-round good student.)

*Personal history.* Height 5 ft. 1 in. Weight 102. Case A is fine looking, sturdy, well-groomed without appearing too well cared for. The health record is unique, as he has never missed a day of school on account of illness. He was somewhat precocious in walking, talking, and teething. A very healthy baby. Mother nursed. Conditions of early development and health seem to have been about ideal.

*Character, temperament, etc.* Case XIV A is quiet, reserved, and manly appearing. Emotionally, he is sensitive, somewhat self-conscious, does not anger easily, has good common sense, very reasonable if a matter is explained, but very sullen if arbitrarily opposed. His mother thinks that his most pronounced characteristic is a desire to be absolutely just, combined with a very fine sense of honor and truthfulness. His teachers substantiate this report. Mother says: "He wants apples, cake, anything, divided exactly and methodically according to number, promise, etc. Has always been absolutely honest with brothers and sisters.

*Ideals, etc.* Case A lives in wholesome, smooth-running environment; has readily conformed to orthodox traditions, and probably has docilely formed habits rather than ideals of any sort. He is non-committal, however, and it is difficult to say to what extent he has given social matters any thought. He belongs to the Christian Church. He is not very chummy with any one; likes reading and ball; and does not know what he wants to become.

*Heredity.* Mixed English and German. Little is to be noted. Paternal grandfather was a teacher; father attended normal school and later entered employ of his father-in-law. Maternal grand-



father a successful wholesale hardware merchant. Nothing else of note secured.

*Home conditions.* The home is the typical, well-to-do business man's home, located on one of the best streets in Los Angeles. From the standpoint of comforts, sanitation, and location it could not be better. The mother seems to have plenty of common sense, and luxuries are carefully controlled. The home is not particularly cultured; the parents are of the orthodox newspaper-reading, uncritical, non-thinking, usual commercial type.

*Home education.* There has been nothing unusual in the manner of discipline or education and little thought or anticipation beyond making the child fit into a well-ordered and well-disciplined home. Mother seems to have no definite theories or panaceas. All that this implies has been habituated to a marked degree. The child is allowed little money, and the mother knows how it is spent. Keeps bank account. There has been less done than one would expect in the way of incidental education. Case A practices the piano faithfully an hour and a half daily, and is making just such progress as one would expect from a methodical, intelligent child without any particular emotional fervor. Goes to the movies once a week. Has had Mechano and a few cardboard puzzles. Runs an automobile. Travel limited to a visit to San Francisco. Reads "Youth's Companion," "Popular Mechanics," and newspapers.

*School records.* An A and B student in a wide range of studies. In A9. Deportment excellent. Best in English; poorest in oral English. School substantiates mother's report concerning general characteristics and temperament.

*Binet Tests.* Ch. age, 13-10; Binet age, 18. Years in advance, 4-2. I. Q., 130.1. In the Superior Adult tests, fails on vocabulary, and both 8 digits and 7 digits reversed. Vocabulary score, 65, which reflects the home and its non-academic character fairly well. However, Case A's distinctions in meanings in defining abstract words is peculiarly good. Does all tests involving reasoning with accuracy and a fair degree of speed. Secured the induction test after the first paper was folded. The most awkward procedure was in the Code test; here Case A went back to A and counted up for each letter. The time, however, was relatively short, considering the method, 2:17. Summary: Case A performs the Binet tests easily and laconically, with a superiority far beyond his years. He is poorest (relatively) in the digits tests, and strongest in the reasoning tests.

*Tests in order.* Sim Add.: accuracy score 253; superior to norm group; somewhat inferior to superior group. Percent of accuracy, fair. Association tests: score about average, compared with the superior group. Binet Letter-Square: about average in the superior group. Linguistic ability: somewhat above average of the superior group in the Directions and Analogies and the Proverbs tests. About



on an average with the superior group in the Trabue and the Marble Statue tests. Relative Values: did not substitute concrete numbers to secure the results. Rank-orders: Ch. age, 37; Binet age, 34; rank-order average, 39. Introspections show mixed imagery, and no particular bias in procedure. Summary: Case A may be considered about average in the superior group. Good intelligence, cautious, methodical, quick, and accurate in rational and logical adaptations, rather superior in most verbal situations, not strikingly brilliant but all-round superior.

*Summary of case.* Superior health, hygienic and economic conditions. Heredity, home, and culture somewhat superior. School reports, Binet Tests, and Psychological tests show well-tempered medium superiority throughout. Would illustrate the so-called factor of general intelligence beautifully; likewise the factor of general, all-round good environment (well ordered home and cultural neighborhood).

#### CASE XV C. Male

(Superior musical ability. Superior intelligence. Radical culture. Serious eye defect. Inferior Health. Poverty. Russian Jew.)

*Personal history.* Height 5 ft. Weight 98. Teeth far apart, wears thick-lensed glasses, has an old, academic appearance. Early development shows retardation in walking and talking. Disease history: bronchitis at 4 months; pneumonia at 9 months; scarlet fever at 5 years; 4 months later diphtheria; 2 months later scarlet fever again; tonsillitis frequently (tonsils and adenoids removed); at 10 had appendicitis. Has had constant difficulty with eyes. Doctor thinks he has been blind in one eye from birth. (First three years in Russia; next 9 in London. Out of school constantly with illness. Has some heart trouble. Still has eye difficulty.

*Character and temperament.* By far the most handicapped and most intelligent (in the experimenter's opinion) of any child studied. Is quiet, good-natured, not very well groomed, a homely but pleasing face, an attractive smile; irregular, not very well kept teeth. Face a little coarse and heavy, partially due to eyes. Is highly individualistic in speech, manner, and ideas, but seems genuine and totally devoid of the attitude of the poser. His mental attitude is hard to describe. It is that of the highly educated, critical, highly-trained university man. He is a determinist, a sustained pessimist, a psychologist, economist, a superior musician (handicaps considered). He reads and understands the more difficult current literature ("Nation," "Dial," "Masses," and "New Republic"). His attitude is detached and philosophical, and quite devoid of vindictive radical attitude. Reads mostly books on biography, harmony, technique, librettos, stories of operas, etc. Has read many of the mod-

ern Russian writers, and many English classics. Wants to become a concert pianist; is now a protégé of a musical club and under the best instruction. Is far behind many a music student in technique but has unusual breadth of interpretation. In spite of poverty has managed to hear many of the best musical performances. Dislikes movies. Outside of music, his particular interests are art (particularly sculpture) and socialism. Most radical in his religious views, and is thoroughly (sic) emancipated from social suggestion and superstition. He has an almost fanatical zeal for learning. The subject's perseverance is almost superhuman as well as pathetic. At present he helps his mother in a public market for three days a week, getting up shortly after five o'clock (on Saturdays sometimes all day, and when mother is ill takes complete charge of market), attends high school, and attempts to practice four hours daily. To this must be added constant trouble with eyes and extreme poverty. Has associated mostly with adults.

*Heredity.* Russian Jew. Father had an elementary education in Russia, is a tailor by occupation, but was engaged for years as a revolutionist, was connected with an underground railroad system for conveying information into Russia. From accounts is very radical, remarkably intelligent, and daring. The mother had a high school education in Russia, is a dressmaker by trade, but the last year has had charge of a vegetable stall in one of the public markets. Has also gone out to work by the day. Has had a serious abdominal surgical operation during the last year. Is really unable to work. The paternal grandfather was highly educated in the church and taught Hebrew—was a good singer.

*Home conditions.* Live in sanitary but very poor quarters at the back of an old grocery store. Conditions unsightly but not really objectionable, in a poorer part of the city. The house is furnished very poorly, a cheap piano, beds, two tables, about four chairs, constitute the furnishings in three rooms (kitchen not seen). No pictures, carpets, or ornaments. Floors very clean and carefully mopped. Father and mother are separated. Training distinctly anti-religious. Mother is a socialist and has explained religion and social conditions in rational terms. Modern Russian writers have constituted a basis for thinking. The culture of such a home is hard to describe. Radical and anarchistic, tearing the pomp and superstition from every institution and tradition. As much at home with Brahms, Beethoven, Bach, Shakespeare, Gorky, Turgenev, Marks, Bertrand Russell, Henry George, as the average American is with Charlie Chaplin. In London the family evidently became acquainted with some musical and artistic people of ability and must have spent much time studying art, music, literature, in an incidental way. The mother (and from all accounts father) has a critical mind, and an insatiable thirst for knowledge. Telling adjectives, and brilliant individuality mark every discussion. Seems to be the



closest love and mutual helpfulness between mother and children.

*Home education.* No definite home training. Children have heard economic, musical, and artistic critical discussions constantly, evidently in Russian, German, and English. Usually Russian and German. Subject reads in German or Russian and understands all that is said but says he speaks poorly. Formal education at school. Bathes frequently, but teeth poorly cared for. Likes flowers; indifferent to animals. Pays little attention to current magazines, except musical ones and the current war news. Is thoroughly posted on the present world war. Helps with the housework, works in the market and tries to practice 4 hours daily. Thinks he will have to drop high school. Has lived in London, New York, Chicago, and Los Angeles.

*School records.* In A11. Skipped B9 and B10. Has been absent much. One-half year at London out-hospital for his eyes, and one-half year for appendicitis; absent on account of his eyes from time to time and also to help mother. Makes good grades except in penmanship. Best in harmony, and poorest in writing which is very poor indeed. Can not play games on account of heart and eyes. (Experimenter doubts that any real interest in plays or games is present.)

*Binet Tests.* Ch. age, 14-11; Binet age, 18-6. Years in advance, 3-7. I. Q., 124. Performs all tests except XVIII year Vocabulary and Repeat 8 Digits. The vocabulary score is 70, words well defined. In connection with vocabulary, three factors must be kept in mind; (1) the subject has associated largely with adults who have spoken German or Russian; (2) the subject has read in German and Russian, thus spending proportionately less reading time upon English; (3) the experimenter has noted in two other cases of subjects devoting too much time to music that the vocabulary was relatively smaller. This was true of XIV G, who, while an excellent student in English literature, was less superior in quantitative report.

*Tests in order.* Sim. Addition: slightly superior to 18 norm and 12 superior. Association tests: about on a par with adult norm and 14 superior. Binet Letter-Square: superior to 16 norm and between 10 and 11 superior. Substitution: superior to 16 norm and about on a par with 15 superior. Directions: superior to 16 norm and about on a par with 15 superior. Trabue: slightly superior to 13 norm and 10 superior. Analogies: about on a par with 16 norm and somewhat inferior to 10 superior. Marble Statue: on a par with adult norm and somewhat inferior to 15 superior. Proverbs: in accuracy on a par with 15 norm and superior to 13 superior. In speed (average time 7' 57'') the score is too low to make comparison with any group; is comparable in accuracy. Relative Values: score of 100% in accuracy, time score 38 seconds per exposure, which means that there is no basis for comparison with either norm or superior groups. Accuracy is superior to all scores; time is much inferior to all scores. Construction



Puzzles: A test, slightly superior to 11 norm in both time and moves, and somewhat inferior to 12 norm and 15 superior. Performs Squares in 5 seconds. Rank-orders: Ch. age, 48; Binet age, 34; rank-order average, 32. Imagery: mixed and very vivid, but tends to the adult practice of associative devices. Summary: is superior to norm scores for the same age but is relatively inferior to the superior group. Is more often superior in accuracy than speed, and shows conspicuous superiority in the accuracy score of the Relative Values, which is the most distinctly reasoning test of any used.

*Summary of case.* Nothing to indicate superior heredity except the superior intellectual grasp and artistic adjustment of both father and mother under very unfavorable circumstances. Home, location, furnishings, far below normal. Sanitation, except teeth, average. Cultural life, critical, radical, philosophical, literary and artistic. Health far below normal, condition of eyes a constant retardation. Poverty very great. Rational attitude, zeal, untiring vitality, critical and philosophical attitude, and artistic appreciation and interpretation of music mark him as unique even in the superior group. The tests alone do not indicate any remarkable superiority, but taken in conjunction with his artistic and philosophical ability one must consider the subject distinctly superior. The scores must be interpreted in the light of poverty, health, and foreign handicap. In the opinion of the experimenter the subject is natively the most superior child in the group studied. Will he be heard from in the musical world? The experimenter doubts it, on the grounds that health, poverty, eyes, and lack of early training are all against the subject. He is more likely to turn to composition.

## SUMMARY OF SOCIAL DATA

*Early Development.* 36 normal; 9 below normal; 5 above normal. Height and weight: somewhat above average, with 8 above in weight and 5 below average weight for age. Everything else being equal, the economic and hygienic condition of the home would cause one to anticipate a superiority here. With the exception of one case, there were no eye or ear defects of a serious nature (see case XV C).

*Emotional make-up.* Seems to be about the same motley array that would be found in any group of individuals. Possibly an abnormal amount of nervousness is reported.

*Home conditions.* 19 have been thrown chiefly with adults. 16 are only children. List of only children with their I. Q.'s: A VI, 172.9; A VII, 160; B VII, 165.4; C VII, 164.3; E VII, 167.4; A VIII, 200; C VIII, 153.9; B IX, 156.8; C IX, 166; A XII, 157.4; D XII, 147.6; C XIII, 141.8; G XIV, 129.6; I XIV, 120.7; D XV, 127.8; G XV, 122.6. Sanitation: average, 24; above, 26; below, 3. Ranking of neighborhood on a basis of 5: 5 homes have a rank of 1; 15 have a rank of 2; 27 have a rank of 3; 6 have a rank of 4; 0 have a rank of 5. Wealth: 2 have a rank of 1; 17 have a rank of 2; 29 have a rank of 3; 5 have a rank of 4; and 0 have a rank of 5. Culture of home: 10 have a rank of 1; 19 have a rank of 2; 20 have a rank of 3; 3 have a rank of 4, and 1 a rank of 5. While for statistical summary culture has been arbitrarily graded, the total cultural setting of many homes is quite incomparable with certain others. The correctly appointed home, with superficial conformity to every leisure class dictate and punctilio, gives an atmosphere of culture that is hard to compare with an artistic, philosophical, keenly critical, economically inferior home of a Russian Jew. Here, home, dress, and foreign manners do not give the superficial impress of culture.

Classifying the occupations of the fathers on Taussig's Scale,



one gets: (1) 14 professional; (2) 30 semi-professional; (3) 7 skilled labor; (4) 1 semi-skilled labor; (5) 1 unskilled labor.

Mother divorced in 4 cases. Mother works in 16 cases; child works in 7 cases. In only two is it due to economic stress, and perhaps in only one. Religion is ordinarily but a mirror of the parents' views, and there is the usual array of denominations found in any group of children in a city. However, in 21 cases the parents and children also have no definite religious views, or are unorthodox. This is a rather unusual proportion for children of Sunday School age.

*Education at home.* 2 (6 and 7 years of age) educated solely at home; 24 incidental home training; 35 have had superior home training; 12 about average home training; and 6 less than average training. 28 have had an unusual number of plays and games; 16 average or slightly above, and 6 scant opportunities with educational plays or games; 3 no exact information. Travel: 8 rank 1; 23 rank 2; 21 rank 3; 1 ranks 4; and 0 ranks 5. Home duties: 9 have none; 14 have an unusual number; 18 have an average number; 12 below average. *The most commendable feature about the home training as a whole has been the endeavor of mothers to give reality by the use of abundant concrete material.*

*Race.* Chiefly mixed American. There are 11 cases of pure (?) Jewish extraction, a very large number in proportion to the Jewish population. Longevity of ancestors: 15 superior; 28 average; 3 below; 7 no score. Capabilities of parents; 8 rank 1; 24 rank 2; 19 rank 3; 1 ranks 4; and 0 ranks 5.

*Abilities of subjects.* Special Linguistic and verbal fluency, 16. This is, however, a significant and dominating factor in all but three of the subjects. Reasoning ability, 23. Music, 11. Dramatics, 5. Dancing, 1. Mechanical and manual, 4. History and geography, 3. Mathematics, 2.

*School records.* 26 have a rank of 1; 9 have a rank of 2; 6 have a rank of 3; 4 have a rank of 4; 2 have a rank of 5; and 7 not ranked; 2 scored twice. Best subject in school: Reading (language, literature, English) 21; Mathematics, 9 (7 above 12 year); Music, 4; Manual and mechanical, 2; History, 8;



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Geography, 2; General Science, 3 (14 and 15 year subjects); 2 are all-round good students; 7 no records. Poorest school subjects: Writing, 16 (with the exception of one or two girls, the subjects up through the 6th grade write very poorly, and of course often very poorly after that year); Mathematics, 10 (and particularly marked in the lower grades); Music, 1; Drawing, 7; Sewing, 7 (girls age 13 and 14); distinctly poor in no subject, 11; no record, 6.

*School grade and age.* 30 are above grade in terms of their chronological age; 16 at grade; 6 below grade; 1 no rating. In a few cases the grade had to be approximated. In terms of mental age: 2 are above grade; 50 below grade; and 1 has no score. The most noticeable thing is that a slight majority of the children are above grade with reference to chronological age, while all but three are below grade in terms of their mental age. The question then arises as to how these children should be graded. The experimenter does not attempt to answer the question. Only careful experimentation and follow-up work with a large number of subjects over a period of years could give a satisfactory solution. However, some seven or eight of the subjects under consideration have been under the experimenter's observation in an opportunity room. To this may be added the valuable testimony of teachers handling the various subjects. And finally, an analysis of the general performance, the school grade under consideration, nature of home training, and a careful judgment on the sum total of the individual's characteristics—health, incidental training, formal training, gaps in training of habit, outside duties and studies—would be necessary.

With the younger children it is probably safe to say that the first four or five grades may be skimmed through rather rapidly, where incidental or home training brings them to school with considerable knowledge of geography, travel, literature, fable, myth, and with a good vocabulary and correct speech. In fact, there is often a definite loss as regards elegant usage, when a child from a cultured home comes in contact with teachers and pupils of a distinctly lower cultural level. The vast majority of



the children under consideration, either through incidental or formal home training, have secured a knowledge of English, a vocabulary, and a familiarity with current topics that may readily make them comparable with a less fortunate child who has had four or five years of schooling. Neither must one forget that much of school time is consumed in correcting the simplest errors of English, and misconception about the most commonplace facts of life. The child with a good incidental home training escapes much of this negative learning, and as an actual fact is probably considerably injured by hours of unnecessary criticisms and corrections. Grade skipping in the lower grades is fairly easy where there is little sequence of subject matter. The cultured home surpasses the school in incidental teaching of reading, literature, appreciation of flowers, love of animals, local geography, concrete synthesizing of facts, correct usages, dancing, music, free play, and for frank individual development and the avoidance of all sorts of social fears and superstitions. Such a home, however, is usually at a disadvantage in securing a certain kind of self-confidence and social adjustment that is so admirably developed in many of our kindergartens.

Probably the sixth or seventh grade is a good place for the child with a superior home training to begin (if training has been incidental, writing, arithmetic, including habituation in the four processes, and the simple rules of composition are usually in need of attention). In the majority of cases the subject has learned to read at leisure and a carefully selected list of books, including geography, history, natural history, travel, and English classics, has given him a good vocabulary, and a fair knowledge of the subject matter through the eighth grade (debarring the distinct terminology and technique of algebra, foreign language, general science, and the more difficult manual training courses, which may be inserted in the intermediate high school). *So long as the incidental (or formal) home training is comparable with the work of the grades, advance is likely to be rapid.*

Of course, to incidental training may be added a very definite and early academic training in several subjects. The nature and

the extent of this tutoring would have to be determined and an adjustment of credits made similar to that for a child coming from another school. An opportunity room often is the best solution, as the home-trained child is likely to be far ahead in subjects relating to language, verbal fluency, vocabulary, and general information. Such a room permits the teacher to give extra time to gaps in training, permits additional work in agriculture or gardening for the frail or anemic child, more play and games for the one needing socializing, and more manual training and shop for the one who tends to be too academic and sedentary in habits, while (consistent with health) special lessons in dancing, music, swimming, fencing, foreign language, etc., may be added *ad libitum*. At present parents are often anxious to provide this extra training where the school will make the necessary concessions. Advance does not necessarily consist in rushing on to the next grade, and a superior child could often be profitably occupied in a more intense, critical, and thorough study of the subject matter.

With the older children (debarring formal home training, or incidental foreign language advantages), the beginning of high school marks the introduction of many subjects which have a definite technique. Subjects at this time are much less influenced by good home training than the grammar school subjects. There is also a series of prerequisites, and a sequence in technique that make grade skipping more hazardous. Time alone, it must be remembered, becomes an important element in habit and technique. Regardless of talent, many years must be devoted to the acquiring of skill in music. Vocabulary in a foreign language, if retained, must be learned and relearned over a long period of time. Much of literature, history, and life involve problems of time, judgment, and secondary sex attitudes and emotions that make it more or less inadvisable to throw a child of 10 or 11 with boys of 17 and 18 regardless of the mental age or vocabulary of the former.

In the judgment of the experimenter, the majority of the subjects are correctly placed in school. In many cases music and



outside work consume an enormous amount of time. In 5 cases, at least, the subjects have not been able to do justice to the ordinary school program, and have reduced their program or dropped out of school in the interest of music. There is not a single case of a superior in high school, who could be advanced in grade without either risk of gaps or decrease in efficiency or else interference with some outside pursuit. The two conspicuous cases of students in high school in grades corresponding to their mental ages are XII A and XIII B. The consensus of opinion of the high school teachers is that these subjects are unable to properly perform the work of the grade in which they are placed.

## CORRELATIONS

As Yule has pointed out in his admirable discussion of correlations (An Introduction to the Theory of Statistics, page 191), "The student . . . should be careful to note that the coefficient of correlation, like an average or a measure of dispersion, only exhibits in a summary and comprehensive form one particular aspect of the facts on which it is based, and the real difficulties arise in the interpretation of the coefficients when obtained. The value of the coefficient may be consistent with some given hypothesis, but it may be equally consistent with others; and not only are care and judgment essential for the discussion of such possible hypothesis, but also a thorough knowledge of the facts in all other possible aspects." The tests presented here are of a diverse nature, involving many individual and qualitative factors, consequently only tentative interpretations can be offered for the correlation tendencies exhibited.

*Explanation of tabulations.* Tabulation A contains the scores from which the hierarchy of correlations, Tabulation C, is obtained. The scores for Tabulation A are compiled from the complete data given in the Appendix tabulations. Tabulation C: all of the correlations are performed by the Pearson method. The upper number in each square is the probable error; the lower number, the correlation. All correlations are positive. Decimals are omitted. Tabulation B is compiled from the Appendix tabulations. After taking numerous factors into account, it seemed best to arrange the scores according to rank-order. Then, by using chronological age, Binet age, I. Q., or all of them in conjunction, it is possible to get the relative performance of a subject in any test. The rank-order average is secured by averaging the rank-orders for all of the psychological tests, exclusive of the Binet series. The score thus secured constitutes a composite value comparable with the Binet score. Tabulation B has proven of great value throughout the discussion of tests and case descriptions. The rank-orders offer opportunity for determining



relative performance between two subjects in the same test, or for the relative performance of the same subject in different tests.

*Discussion of the correlations.* Tabulation C. 1. The Binet Tests show the highest average tendency to correlation of any of the tests used.

2. The rank-order average is next highest in average tendency to correlation. The pooling of scores from several tests tends to increase the rank-order average. Factors common to several tests seem to be summated and accentuated.

3. The vocabulary and association tests follow with but slightly lower correlation averages. It will be noted that there is a general tendency for tests involving verbal fluency and language and meaning to intercorrelate highly.

4. The Substitution Test and the Binet Letter-Square both show a high average correlation. In neither case is success based upon verbal fluency or language directly. In the Binet Letter-Square, resourcefulness in the use of mnemonic devices and superiority in immediate memory span (visual, auditory, verbal, or combined) seem to be the chief factors making for success. In the Substitution Test speed and accuracy in a more or less mechanical memory situation seem to be the prerequisites. The correlations are compiled from the time scores, consequently the essential factor would seem to be associative speed. Associative speed and cleverness in the use of mnemonics may be a matter of formal training or innate ability.

5. The Directions Test stands sixth in the hierarchy. Its performance is primarily a matter of verbal associations. With younger children the mechanics of reading may easily play a part.

6. Analogies B ranks eighth, and Analogies Total ranks tenth in the hierarchy. The total score is probably less representative than the B test, due to the fact that Test C proved too difficult for a large number of the subjects. Besides requiring verbal fluency, the analogies introduce an element of judgment (associative selection) due to the highly controlled nature of the associations.

7. The Trabue Tests rank (combined) eleventh in the hierarchy, and have the common elements of a verbal and linguistic nature along with several other tests. In addition, the test depends upon judgment, inference, and ingenuity and resourcefulness in utilizing an array of meaning possibilities.

8. The Proverbs Test ranks twelfth in the hierarchy. Besides verbal fluency and linguistic ability, the subject needs must reduce certain idiomatic expressions to generalized terms (generalizing abstraction).

9. It will be noted that of all of the single tests, the vocabulary and association tests give the highest average correlation score. These tests are most clearly dependent upon verbal meanings and verbal fluency. The Trabue and the Proverbs tests are in part dependent upon other factors (inference, judgment, synthesis). It will be noted that there is a general tendency (within the linguistic group of tests) to decrease in correlation with increase in complexity and difficulty of the test. It is unfortunate that the qualitative scores for vocabulary are not suitable for correlation purposes. The niceties of word meaning more clearly demark the superior group than the quantitative scores.

10. *There is a sharp cleavage in the average correlation tendency between the last linguistic test (Proverbs) and the next in order in the hierarchy, the Relative Values test.* The latter would involve language only indirectly and slightly.

11. Simultaneous Addition involves attention to a mechanical type of task demanding distributive sustained attention. This test probably is least affected by training or information of any of the tests given. It is significant that its average tendency to correlation is low. This may be interpreted to mean: (1) That the ability to give a high degree of distributive sustained attention is of little significance in tests in general; (2) that attention is specific, not general; (3) that high correlations are dependent upon common environments (academic) factors, rather than native ability in attention.

12. The Marble Statue is distinctly a reading, linguistic, and "logical memory" test, and, *a priori*, one would anticipate a high



correlation with all tests of a verbal or linguistic nature. The probable causes for failure have been discussed in connection with the Marble Statue Test. The significant thing to be borne in mind is the need of analysis of the individual and peculiar factors related to the performance of any test.

13. It will be noted, however, that certain hierarchial tendencies remain which are not explained in terms of the direct influence of verbal fluency, academic adaptation, linguistic ability or information. For example, Relative Values correlates most highly with the Binet Tests; next with the rank-order average; next with vocabulary; next with the Substitution Test; then with the Proverbs Test, and so on. It is hard to say what the additional common factors here are—possibly associative fluency and attitude of attention and work. The relatively high correlation with the Proverbs Test is possibly related to age. In both tests the rank-order conforms more closely to the chronological age rank-order than with tests predominantly linguistic-verbal, in which there is a tendency for the younger children to be relatively superior.

14. The hierarchial tendency would seem to indicate "that all branches of intellectual activity have in common one fundamental function (or group of functions), whereas the remaining or specific elements of the activity seem in every case to be wholly different from that in all the others." (C. Spearman, "General Intelligence Objectively Determined and Measured," *Am. Jr. Psych.*, Vol. 15, page 284.) This common factor or group of factors has come to be designated General Intelligence, and the greatest diversity of opinion exists concerning its nature. Wundt would make Attention the essential factor in intellectual power. Others have suggested general neural plasticity, intellectual vitality, intellectual energy, and so on. Hart and Spearman (*Br. Jr. of Psych.*, Vol. 5, page 79) think that "This General Factor is not any special sort of process, such as an 'intelligent' or 'synthetic' operation." "The fact of correlation existing between quite different intellectual performances seems to be fundamentally identical with the fact that any such performance in-

hibits quite different simultaneous ones. Both phenomena are explicable by conceiving that every performance depends partly on some common fund of energy. This, then, is the required General Factor. Explanation by 'attention' seems inadequate."

Thorndike (*Educational Psychology*, Vol. III, page 363 ff.) is apparently to a large extent in harmony with Spearman's view. Quoting Hart and Spearman (*Br. Jr. of Psych.*, page 58), "It was never asserted, then, that the General Factor prevails exclusively in the case of performances too alike: it was only said that when this likeness is diminished (or when the resembling performances are pooled together), a point is soon reached where the correlations are still of considerable magnitude, but now indicate no common factor except the general one. The latter, it was urged, produces the basal correlation, while the similarities merely superpose something more or less adventitious. Up to the present, however, these similarities seem to have exercised surprisingly small influence. In all the performances dealt with in the next section, only three times did any of them resemble each other closely enough to require pooling; these cases will be discussed in detail later on." Thorndike adds: "The view, so stated, does not differ from the view to be presented in this volume, save in the intimation in the last sentence that the 'similarities' other than in the general factor's strength, are of trivial effect in comparison with it."

In attacking the view of Spearman which places great emphasis on the common factor, Thorndike (*ibid.*, page 364) says: "This doctrine requires not only that all branches of intellectual activity be positively correlated, which is substantially true, but also that they be bound to each other in all cases by one common factor, which is false. The latter would require that no two intellectual abilities or branches of intellectual activity should be more closely related to each other than to the fundamental function by which they are supposed to be related; and, as a corollary of this, that no four such abilities, A, B, C, and D, should be more closely related in pairs, A to B, and C to D, than the element common to A and B is related to the element common to



C and D. But unless one arbitrarily limits the meaning to 'all branches of intellectual activity' so as to exclude a majority of those so far tested, one finds traits closely related to each other but with their common element only loosely related to the common element of some other pair." Two matters are then problematical at the present time: (1) the nature of the Common Factor; (2) the importance of the common factor or factors in intellectual situations.

As regards the essential and common factors of intelligent action, it is difficult to find agreement. Woodworth thinks: "Two important features of intelligent action are quickness in seizing the key to a novel situation, and firmness in limiting activity to the right direction and suppressing acts which are obviously useless for the purpose in hand." (Woodworth, R. S., *Racial Difference in Mental Traits*. Science, New Series, Vol. 31, page 180). Thorndike says (*ibid.*, page 221): "We do not know just what the symptoms of intellect are, but apparently quickness and accuracy in making purely mental associations, ability to respond to parts or elements of situations which cannot be abstracted in reality but only in thought, the consequent power to devise new responses to old situations, and a marked development of the instinctive satisfaction in thought for its own sake are leading ones." Concerning tests he adds (*ibid.*, page 276): ". . . . in the case of many measurements of mental traits, . . . . the change due to an individual's age would be possibly due not only to the maturing of the trait or the influence of training upon it, but also to the influence of both maturity and training upon the ability to understand and the wish to follow instructions and the ambition to do well in tests. This complex of traits we may call general ability in tests."

According to Stern: "*Intelligence is a general capacity of an individual consciously to adjust his thinking to new requirements: it is general mental adaptability to new problems and conditions of life.*" (W. Stern, *The Psychological Methods of Testing Intelligence*, page 3.) He adds (*ibid.*, page 4): ". . . . the fact that the capacity is a *general capacity* distinguishes intelligence

from *talent* the characteristic of which is precisely the limitation of efficiency to one kind of content. He is intelligent, on the contrary, who is able easily to affect mental adaptation to new requirements under the most varied conditions and in the most varied fields. If talent be a material efficiency, intelligence is a formal efficiency." Stern's definition is fairly representative of the view held by those working with mental tests.

*The nature of the common group and specific factors making for correlation:*

1. In the opinion of the experimenter, there is no satisfactory evidence at hand regarding the nature of the common, specific, or group factor or factors, that make for the hierarchial tendency in the correlation coefficients in mental tests and estimated intelligence.<sup>1</sup> In massing together a number of quantitative or

<sup>1</sup> Godfrey H. Thomson and J. C. M. Garnett in a series of articles in *The British Journal of Psychology*, May, 1919, pages 321-368, discuss the character of the factor making for correlation when dealing with three correlated variables, and when dealing with the hierarchy of correlation. Concerning the three variables Thomson concludes:

"1. The comparison of a partial correlation coefficient  $r_{12.3}$  with an entire coefficient  $r_{12}$  is no sure guide to the extent to which the connexion of 1 and 2 is via 3.

"2. If the correlations are produced by a mechanism such as overlapping dice throws, and if

$$r_{12}^2 + r_{23}^2 + r_{31}^2 + 2r_{12}r_{23}r_{31} > 1,$$

then at any rate *some* of the connexions of 1 and 2 *must* be via 3.

"3. In this paper only the simplest case, viz. that of three variables, has been considered. There have been made, however, sweeping deductions as to the pressure of General Ability in many forms of activity, based upon methods depending largely, if not entirely, upon a similar misinterpretation of the methods of partial correlation."

A footnote referring to Yule is also of significance: "I hope it will not be thought that this article is in any way contrary to the statements as to the significance of the partial correlation coefficient made by Mr. Udny Yule in the lucid memoirs in which he first introduced and afterwards generalized this coefficient. (Pro. Roy. Soc. 1896 and 1907 respectively). Mr. Yule makes no deductions (and rightly) as to the mechanism producing the correlations."

In attacking the problem of hierarchies, Thomson resorts to card dealing where the various possibilities of the mechanics of chance may be definitely determined and accounted for (*ibid.*, page 337, also *British Journal*, 1916, Vol. VIII, page 271). He finds that "The result of the investigation is to confirm the statement already made that there are many theories in addition



qualitative scores we secure a certain composite picture indicating the general tendency of performance. It might be fancied as to that of Professor Spearman, which will explain such hierarchical order as is actually found, and that mathematical analysis of the data to hand is as yet unable to distinguish between these theories.

"The mind, in carrying out any activity such as a mental test, has two levels, at which it can operate. The elements of activity at the lower level are entirely specific, but those at the higher level are such that they may come into play in different activities. Any activity is a sample of these elements. The elements are assumed to be additive like dice, and each to act on the 'all or none' principle, not being in fact further divisible."

In a *Joint Note on "The Hierarchy of Abilities"* Garnett and Thomson conclude that "If the hierarchy is perfect there is one and only one general factor *g* and no group factors, but there may be any number of specific factors in addition.

"Imperfect hierarchies formed by the correlations between *n* *q*'s may therefore be accounted for either by supposing that a single general factor and *n* specific factors are present, together with comparatively insignificant group factors which vanish in the limit when imperfection becomes perfection; or (b) by supposing that the correlations are due to a number of elements that are additive, each setting on the 'all-or-none' principle, which may appear in any number of tests but are not necessarily present in all—that is, group factors.

"For reasons which are not relevant in this connexion, we differ in the order of preference we assign to these alternative hypotheses, each of which, however, we agree to be mathematically possible."

In the hierarchy presented in this study the alternatives could be either the factors under (a) or (b). Practically all of the psychologists who have written on the nature of general ability have assumed that whether it is simple or complex in character, it is at least innate, and often the assumption seems to be that the factor is *innate and not educable*. Garnett demonstrates a much more flexible interpretation, and in a footnote raises the question as to whether the factors making for hierarchial tendency needs must be innate: "The view that '*g*' is educable is inconsistent with that expressed by Mr. Burt (This Journal, III, 176); but Mr. Burt's argument that '*g*' is innate seems to me inclusive. On the contrary, there seems to be a considerable balance of evidence that '*g*' is educable, although its educability may be innate."

It is, however, interesting that it does not seem to have been emphasized by any of the experimenters that the common, group or specific factors could just as well be environmental as innate. Also, it would be quite as easy\* to make a rationally plausible case for environment from the empirical data as for heredity.

\*(See Galton's *F. Hereditary Genius*; Constable's "Poverty and Hereditary Genius," a reply to Galton; and Ward's *Applied Sociology*, index references to genius.)

analogous to the "clinical picture" in disease. There are also certain general trends in performance. Different individuals may present similar mental pictures, but there is no guarantee that the cause or causes are identical or of proportional importance in different individuals. To continue our analogy of the "clinical picture," the composite mental picture may be comparable to the syndrome rather than a specific disease. An analysis of the introspections, psychologizings, education, social history, causes for error, attitudes and so on, leave no one in doubt that the factors determining the character of performance are not constant from individual to individual.

2. The common factor or factors may be a varying admixture of innate ability, formal training, incidental education, and social conditions. Linguistic ability, verbal fluency, vocabulary, concept formation, thinking in terms of symbols, etc., always rest in part upon some innate characteristic such as native memory capacity and native speed and accuracy in association. Superior linguistic ability, vocabulary and associative verbal fluency could likewise arise out of average native ability but superior linguistic, cultural, formal, informational, incidental, economic, and general environmental opportunities. The burden of proof would rest with any one who champions, any specific factor as being predominantly the cause for a large vocabulary, or allied linguistic skills. In the opinion of the experimenter, the social histories of several of the subjects indicate this clearly. In many cases the data regarding the parents reveal nothing beyond average ability. To this is added schooling for two or three generations, academic ambitions for the children on the part of the parents, plus economic conditions more or less favorable for the cultural attitude. In contrast, there is also no doubt that in certain cases the social evolution in the home is entirely inadequate to explain the superiority, at least the conspicuous superiority, of the subject in question.

Linguistic and verbal fluency along with vocabulary and meaning constitute together a composite factor which accounts in part for the general hierarchial tendency of tests when correlated.



This composite verbal factor may be extremely variable in character, being the product of varying degrees of social and innate factors.

3. Speed and accuracy in association and purely ideational situations could readily be a common factor and would most easily account for some of the fairly high correlations where the linguistic element is at a minimum. For example:

Relative Values and Proverbs.

Relative Values and Substitution.

Relative Values and Recall.

Relative Values and Total Association.

Also,

Simultaneous Addition and Total Association.

Simultaneous Addition and Directions.

If training (formal discipline) is capable of producing a "general associative alertness," this factor may be an acquired one. Associative experience could also readily provide some common elements of associative fluency. The more conspicuous the associative speed and accuracy under novel situations the more probable its innateness.

4. The very high general tendency to correlation of the Binet Letter-Square would seem to indicate that immediate memory span may be a common factor of considerable significance (probably indirectly) in nearly all of the tests. However, associative resourcefulness in the use of mnemonics was characteristic of the performance of many of the older subjects. Associative memory would here supplant immediate mechanical memory span.

5. What James spoke of as brute memory (native memory) ability could readily be a common factor. It is also obvious that superior verbal memory in its broadest sense could conceivably rest upon native retentive capacity or could result from unusual incidental or training conditions in conjunction with but mediocre memory capacity.

6. Hart and Spearman's suggestion that the required general factor may be a "common fund of energy" seems a plausible explanation for at least one of the possible indirect factors. Such

an explanation also fits in well with the observed attitudes of many of the superiors; usual capacity for sustained attention, zeal, a sort of omnivorous appetite for learning, ease and energy in attacking every problem. Seemingly, though, a common fund of energy would be readily affected by various physiological conditions as nutrition, fatigue, and so on.

7. Wundt looks upon attention as the essential factor in intelligence. A sustained attention, and the ability to distribute attention are necessary to efficiency in association and memory. Superiority might consist in a more vicarious attentive capacity; less hampered by ideational habits. Attention, as a common factor, could presumably be innate. If we grant formal discipline, it could be a matter of training. One might acquire a certain attentive attitude or set, with which he would attack any problem demanding secondary attention. A general attentive capacity of this sort could readily exert influence on all the thought processes.

8. It has been customary for most educational psychologists to consider the common factor of intelligence of innate origin, but it could be argued with equal propriety by the anthropologist or sociologist that the common factors (or factor) are language, verbal fluency, academic set, economic determinism, habituated direction of attention, emotional attitudes, the summative character of the social milieu exerting influence through several generations, family pride, ambition, tradition, reputation, assurance, and so on, which are matters of environment.

9. The experimenter believes that the so-called common factor is of a composite nature. The relative importance of the sub-factors could conceivably vary with the individual, with the different combination or groups of tests, with the nature of the scores correlated (qualitative or quantitative), and with varying admixtures of innate and acquired characteristics. The common factor may in many cases produce but a moderate positive correlation, while some factor peculiar to the group of tests in question may be the essential factor in producing a high positive correlation.



## CORRELATION A

Subject	Binet	Simultaneous Addition Number of correct Additions in 15 Min.	Total Number of Correct Associations in 1 Minute	Binet Letter-Square Total Score	Substitution Time in Seconds Sheet I	Substitution Time in Seconds Sheet III—Recall	Time in Seconds Direction Test Corrected for Errors	Trabue Combined Score B and C Test	Analogies Average Time per Correct Response	Analogies Total No. of Correct Responses in A, B, C
VI A- 6- 5	132		23	99			326	25	8.8	36.5
VII A- 6- 8	128		23	145	409	616	438	18	18.6	39.5
B- 6- 9	134			68					8.2	31.0
C- 7	138		37	140	515	388	323	22	12.0	35.0
D- 7	113		18	90					8.3	
E- 7- 2	144		23	124	876	737	415	28	18.7	45
F- 7- 2	138	94	30	78	812	725	400	20	12.0	34
G- 7- 3	119		24	138	447	360	488	22	10.2	36
VIII A- 8	192	228	39	191	421	350	171	21	5.6	46
B- 8- 2	150	112	34	108	572	330	291	21	7.2	44
C- 8- 6	157	194	37	124	591	620	251	25	7.4	43.5
IX A- 8-II	162			153	615	290	522	22	5.3	48.0
B- 9- 3	174	131	37	181	550	301	428	29	3.8	53.0
C- 9- 4	186	164	49	180	410	290	155	32	4.7	50.5
D- 9- 3	148	85	26	141	356	218	224	23	5.6	47.0
X A- 9-10	179	138	51	175	315	310	186	27	2.5	53.5
B-10- 1	185	129	53	210	265	180	174	30	5.8	49.0
C-10- 1	212	190	39	236	290	240	204	27	7.1	55.0
D-10- 2	140	88	31	107	312	338	185	22	6.4	47.0
E- 9-10	169	110	31	172	470	405	263	26	4.4	40.0
XI A-11- 3	170	114	55	217	320	182	165	31	4.9	48.0
B-11- 3	202	238	58	284	135	160	91	31	3.7	53.5
XII A-11- 9	222	181	73	262	260	158	149	31	3.1	51.5
B-12- 1	222	184	88	270	185	120	149	29	2.5	59.0
C-12- 2	200		56	188	245	198	177	30	4.8	48.0
D-12- 3	217	163	83	204	211	149	104	32	1.9	52.0
E-12- 4	222	233	94	344	219	230	139	31	4.3	55.0
F-12- 3	202	300	69	224	235	191	176	32	3.3	48.0
XIII A-12- 7	176	420	64	242	246	134	210	20	5.7	40.5
B-12- 8	190	282	45	333	272	120	138	24	4.4	53.0
C-12- 9	217	418	74	331	263	171	119	33	3.7	50.0
D-13- 6	222	239	50	203	223	141	155	23	3.8	58.0
E-13- 6	228	291	64	303	287	273	123	32	3.4	50.0
F-12-10	204	239	59	229	197	156	136	26	6.8	53.0
G-13- 3	211	421	67	225	218	232	100	27	3.3	54.0
H-13- 6	220	347	63	199	200	155	138	35	3.5	55.0
XIV A-13-10	216	253	71	255	270	155	145	31	3.3	52.0
B-13-11	222	253	83	293	190	140	134	27	2.6	60.0
C-13-11	202	188	56	220	257	257	190	22	5.1	54.5
D-14	223	223	75	340	206	122	142	36	4.5	54.5
E-14- 1	223	564	48	277	268	332	154	29	6.5	52.0
F-14- 3	211	253	65	214	176	148	109	33	3.5	56.0
G-14- 4	223	501	68	235	221	149	142	26	4.7	53.0
H-14- 4	222	163	49	240	215	164	283	37	4.1	55.0
I 14- 6	210	361	88	316	172	150	115	32	2.6	51.0
XV A-14- 9	216	173	62	203	220	151	160	28	3.7	52.0
B-14-10	217	171	62	144	313	170	207	31	6.4	50.0
C-14-11	216	228	65	218	224	162	153	27	5.2	47.0
D-15	230	355	73	380	211	160	209	35	4.2	54.0
E-15	234	684	90	312	137	108	88	28	3.2	53.0
F-15- 5	234	383	86	340	180	121	120	30	4	50.0
G-15- 6	228	272	53	260	267	281	144	30	3.6	57.0
H-15- 1	206	341	62	256	281	195	236	27	4.2	54.0

RELATION A

<i>Direction Test</i> Corrected for Errors	<i>Trabue</i> Combined Score B and C Test	<i>Analogies</i> Average Time per
326	25	8
438	18	18
		8
323	22	12
		8
415	28	18
400	20	12
488	22	10
171	21	5
291	21	7
251	25	7
522	22	5
428	29	3
155	32	4
224	23	5
186	27	2
174	30	5
204	27	7
185	22	6
263	26	4
165	31	4
91	31	3
149	31	3
149	29	2
177	30	4
104	32	1
139	31	4
176	32	3
210	20	5
138	24	4
119	33	3
155	23	3
123	32	3
136	26	6
100	27	3
138	35	3
145	31	3
134	27	2
190	22	5
142	36	4
154	29	6
109	33	3
142	26	4
283	37	4
115	32	2
160	28	3
207	31	6
153	27	5
209	35	4
88	28	3
120	30	4
144	30	3
236	27	4



A

B and C Test	Analogies Average Time per Correct Response	Analogies Total No. of Correct Responses in A, B, C	Marble Statue Number of Correct Ideas	Proverbs Test % Accuracy Total I, II, III, IV	Relative Values % of Accuracy	Vocabulary Test	Rank-Order Average
	8.8	36.5	34			32	4
	18.6	39.5	29			24	6
	8.2	31.0				47	2
	12.0	35.0	34	45		33	8
	8.3					20	1
	18.7	45		43		45	4
	12.0	34	43		55	35	7
	10.2	36	34			32	5
	5.6	46	38	32.5	55	61	15
	7.2	44	47	25		39	12
	7.4	43.5	34	37.5	65	43	11
	5.3	48.0	28	62.5		43	9
	3.8	53.0	21	95.0	55	48	16
	4.7	50.5	44	90.0	65	71	21
	5.6	47.0	38	42.5	60	35	14
	2.5	53.5	37	87.5	55	64	18
	5.8	49.0	42	65	65	42	19
	7.1	55.0	32	85	65	75	17
	6.4	47.0	36	42.5		39	10
	4.4	40.0	30	65	35	53	13
	4.9	48.0	52	95	60	47	24
	3.7	53.5	26	87.5	75	65	37
	3.1	51.5	38	95	70	84	42
	2.5	59.0	43	90		65	46
	4.8	48.0		62.5		55	20
	1.9	52.0	37	90		69	35
	4.3	55.0	36	97.5	70	84	43
	3.3	48.0	20	82.5	75	53	31
	5.7	40.5	36	42.5	65	46	22
	4.4	53.0		80	70	64	27
	3.7	50.0	43	87.5	85	72	47
	3.8	58.0	38	62.5	70	75	28
	3.4	50.0	55	92.5	80	82	41
	6.8	53.0	38	80	65	65	30
	3.3	54.0	34	90	60	68	34
	3.5	55.0	43	100	75	83	48
	3.3	52.0	38	92.5	70	65	39
	2.6	60.0	41	90	70	72	44
	5.1	54.5	38	92.5	75	51	23
	4.5	54.5	33	92.5	75	78	49
	6.5	52.0	32	95	100	60	25
	3.5	56.0	36	87.5	80	60	45
	4.7	53.0	48	92.5	60	65	37
	4.1	55.0	41	100	95	75	38
	2.6	51.0	40	92.5	75	76	52
	3.7	52.0	40	87.5	95	65	33
	6.4	50.0	40	95	90	67	26
	5.2	47.0	39	85	100	70	32
	4.2	54.0	44	97.5	75	83	50
	3.2	53.0	52	100	80	76	53
	4	50.0	39	100	85	81	51
	3.6	57.0	46	100	95	79	40
	4.2	54.0	40	57	65	65	29

## CORRELATION F

Subjects	Chronological Age	Binet Score	I. Q.	Simultaneous Addition	Association Tests				Binet Letter-Square	Substitution, Time Sheet I	Substitution, Time
					Opposites	Part-Whole	Genus-Species	Totals			
VI A-6-5	1	4	52	5.5		6	7	5	4	n	n
VII A-6-8	2	3	46	5.5	6.5	8.5	3	5	13	12	9
B-6-9	3	5	49	5.5	n	6	3	n	2	n	n
C-7	4.5	6.5	48	5.5	29	12	7	13.5	10	7	9
D-7	4.5	1	26	5.5	2	1.5	7	3	3	n	n
E-7-2	6.5	9	51	5.5	15	1.5	3	5	7.5	1	4
F-7-2	6.5	6.5	47	11	6.5	12	11	9	1	2	5
G-7-3	8	2	28	5.5	6.5	6	7	7	9	9	10
VIII A-8	9	22	53		24	25	16	16	20	10	11
B-8-2	10	11	40	13	13.5	15.5	29.5	12	6	5	14
C-8-6	11	12	43	28	10.5	12	19	13.5	7.5	4	6
IX A-8-II	12	13	37	5.5	13.5	8.5	(n)	(n)	14	3	17
B-9-3	13.5	16	44	16	12	3.5	25	16	18	6	16
D-9-3	13.5	10	25	10	6.5	12	7	8	11	14	25
C-9-4	15	20	50	21	16.5	25	23	20.5	17	11	17
X A-9-10	16.5	18	38	17.5	20	29	19	23	16	16	15
E-9-10	16.5	14	42	12	10.5	15.5	10	10.5	15	8	8
B-10-1	18.5	19	39	15	20	40	23	24.5	22	13	30
C-10-1	18.5	32	10.5	27	9	12	26.5	16	35	19	21
D-10-2	20	8	2	17.5	3.5	3.5	19	10.5	5	18	12
XI A-II-3	21.5	15	13	14	32.0	19	29.5	36	27	15	29
B-II-3	21.5	25	35	33	20.0	40	34	29	44	50	36
XII A-II-9	23	42.5	45	24	42	47.5	52	43.5	41	27	37
B-12-1	24	42.5	41	25	50.5	44.5	46	50.5	42	45	51
C-12-2	25	23	29	(n)	29	29	26.5	27.5	19	30	26
D-12-3	26.5	37	34	19.5	53	34	34	47.5	25	40	43
F-12-3	26.5	25	31	42	48	19	29.5	41	30	31	28
E-12-4	28	42.5	36	32	49	52	50	53	33	36	24
XIII A-12-7	29	17	3	49	40	44.5	19	35.5	37	29	48
B-12-8	30	21	12	40	16.5	25	13	18	50	22	51
C-12-9	31	37	32	48	38	40	48	45	49	26	31
F-12-10	32	27	21	34.5	35.5	19	38	30	32	43	38
G-13-3	33	30.5	22.5	50	45	49	14.5	39	31	37	23
D-13-6	35	42.5	30	34.5	26	29	14.5	22	23.5	33	46
E-13-6	35	49.5	33	41	38	29	34	35.5	46	20	20
H-13-6	35	39	27	44	35.5	40	29.5	34	21	42	39
XIV A-13-10	37	34	19	37	46.5	34	34	42	38	23	39
B-13-11	38.5	42.5	24	37	24	53	51	47.5	45	44	47
C-13-11	38.5	25	5	26	20	19	43	27.5	29	28	21
D-14	40	47	22.5	29	42	47.5	43	46	51.5	41	49
E-14-1	41	47	20	52	20	19	23	19	43	24	13
F-14-3	42	30.5	9	37	38	29	38	37.5	26	47	45
G-14-4	43.5	47	17	51	44	22.5	40.5	40	34	34	43
H-14-4	43.5	42.5	16	19.5	42	37	12	20.5	36	38.5	33
I-14-6	45	29	4	46	52	40	43	50.5	48	48	42
XV A-14-9	46	34	7	23	24	34	45	32	23.5	35	41
B-14-10	47	37	6	22	33.5	34	38	32	12	17	32
C-14-11	48	34	10.5	30.5	29	44.5	40.5	37.5	28	32	34
D-15	49.5	51	15	45	20	51	48	43.5	53	38.5	35
E-15	49.5	52.5	18	53	46.5	50	53	52	47	49	53
H-15-1	51	28	1	43	29	44.5	34	32	39	21	27
F-15-5	52	52.5	14	47	50.5	34	48	49	51.5	46	50
G-15-6	53	49.5	8	39	33.5	22.5	19	24.5	40	25	19

n = no score, unable to perform.  
 (n) = no score, test not given.



TION B—Rank-Orders

Sheet I	Substitution, Time Sheet III, Recall	Directions Time	Trabue Combined Score	Analogies Av. Time Total	Analogies—Total No. Correct Responses	Marble Statue No. Correct Ideas	Proverbs Test Accuracy Total	Relative Values % Accuracy	Total Rank	Average Rank	Rank-Order Average	Vocabulary Rank-Order
n	n	9	17.5	6	6	17	n	n	81.5	5.8	3.5	3.5
2	9	5	3	2	7	9.5	n	n	124.5	8.9	6	2
n	n	n	n	8	2	n	n	n	26.5	1.9	2	15.5
7	9	10	10.5	3.5	4	17	14	n	139	9.9	8	5
n	n	n	n	7	n	n	n	n	2.6	1.8	1	1
1	4	7	10.5	1	12	n	13	n	81.5	5.8	3.5	13
2	5	8	4.5	3.5	3	43.5	n	16.5	127.5	9.1	7	6.5
9	10	4	10.5	5	5	17	n	n	9.5	6.8	5	3.5
0	11	27	6.5	18.5	13	29	8	16.5	255	18.2	15	24
5	14	11	6.5	10	11	48	9	n	193	13.8	12	8.5
4	6	14	17.5	9	10	17	7	25.5	187	13.4	11	11.5
3	17.5	3	10.5	20	18.5	8	18	(n)	140.5	11.7	9	11.5
6	16	6	31	36	35	6	44	16.5	271	19.4	16	17
4	25	16	14.5	18.5	15	29	11	25.5	221	15.8	14	6.5
1	17.5	30.5	45	25.5	26	46.5	33	25.5	363	25.9	21	38
6	15	22	24.5	51	38.5	24.5	28	16.5	337.5	24.1	18	25.5
8	8	13	20	28.5	8	11	19.5	14	194	13.9	13	19.5
3	30	26	34.5	16	21	41	19.5	25.5	346.5	24.8	19	10
9	21	20	24.5	11	46.5	12.5	24.5	25.5	314	22.4	17	42
3	12	23	10.5	14.5	15	21.5	11	n	176	12.6	10	8.5
5	29	28	38.5	23	51.5	44	20	396	27.9	24	15.5	15.5
0	36	52	39.5	39	38.5	7	28	38.5	498	35.6	36.5	30
6	37	34.5	39.5	48	28	29	44	32.5	525.5	37.5	42	52.5
5	51.5	34.5	31	52	52	43.5	33	(n)	550.5	39.3	46	30
0	26	24	34.5	24	18.5	(n)	17	(n)	277.5	25.2	20	21
9	43.5	50	45	53	30.5	24.5	33	(n)	485	34.6	35	36
1	28	25	45	45.5	18.5	9.5	23	38.5	432.5	30.9	31	19.5
9	24	40	39.5	30	46.5	21.5	47.5	32.5	533.5	38.1	43	52.5
2	48	17	4.5	17	9	21.5	11	25.5	372	26.6	22	14
9	51.5	41.5	16	28.5	35	(n)	21.5	32.5	388	29.8	27	25.5
3	31	47	48.5	39	23.5	43.5	28	46.5	556	39.7	47	39.5
8	38	43	20	12	35	29	21.5	25.5	427	30.5	30	30
7	23	51	24.5	36	41	17	33	20	472	33.7	24	35
1	46	30.5	14.5	36	51	29	17	32.5	418.5	29.9	28	42
9	20	45	45	44	23.5	53	38.5	44.5	521.5	37.3	41	49
8	39.5	41.5	50.5	42.5	46.5	43.5	51	38.5	565.5	40.4	48	50.5
3	39.5	36	39.5	45.5	30.5	29	38.5	32.5	503.5	36	39	30
4	47	44	24.5	49.5	53	39.5	33	32.5	540	38.6	44	39.5
9	21	21	10.5	22	43.5	29	38.5	38.5	389.5	27.8	23	18
1	49	38.5	51	27	43.5	14	38.5	38.5	576.5	41.2	49	46
3	13	32	31	13	30.5	12.5	44	52.5	409.5	29.2	25	22.5
8	45	49	48.5	42.5	49	21.5	28	44.5	543	38.8	45	22.5
5	43.5	38.5	20	25.5	35	49.5	38.5	20	498	35.6	36.5	30
5	33	12	53	33	46.5	30.5	51	49.5	502.5	35.9	38	42
9	42	48	45	49.5	27	36.5	38.5	38.5	602	43	52	44.5
1	41	29	28.5	39	30.5	36.5	44	49.5	466.5	33.3	33	30
3	32	19	39.5	14.5	23.5	36.5	24.5	52.5	415	29.6	26	34
8	34	33	24.5	21	16	33.5	47.5	44.5	443.5	31.7	32	37
5	35	18	50.5	31.5	41	46.5	51	44.5	579	41.4	50	50.5
9	53	53	28.5	47	35	51.5	15	25.5	660	47.1	53	44.5
1	27	15	24.5	31.5	41	36.5	51	46.5	426	30.5	29	30
3	50	46	34.5	34	23.5	33.5	51	46.5	596	42.6	51	48
8	19	37	34.5	41	50	49.5	51	49.5	509	36.4	40	47





10. Finally, the question arises as to whether this general factor, or more probably group of factors, is a *sine qua non* for general intelligence or for superior intelligence. In the opinion of the experimenter, no series of tests has been devised that goes to the heart of the matter in so far as superior intelligence is concerned. Superior intelligence would seem to demand not only superficial resourcefulness, cleverness in puzzles and tricks, agility in association, and linguistic and verbal fluency, and so on, but certain other factors difficult to define and more difficult to measure.

These factors involve *both social judgment and time* and would seem to be essential to superior adjustment and intelligence. The first fact to keep in mind is the very human tendency to seek an immediate solution for a problem. To suspend judgment over a long period of time is irritating; any sort of solution is emotionally satisfying. In the actual complex problems of life we have no guarantee of easy or immediate solution, sometimes no solution is forthcoming. Facts must be pondered and repondered, with a certain wholesome skepticism as to their validity and relative importance along with a certain skepticism of our own doubts and beliefs. To solve a problem in algebra or formal logic is comparatively simple. The values are static and solution is assured. In social problems values are uncertain, fleeting and partial. Superior intelligence is shown in the ability to suspend judgment for a *long* period of time, to survey a large number of purported facts as to their relevancy, truth, and importance, and to resist the undue importance that immediacy may give to certain elements in judgment. In so far as the writer knows, no test measures or is indicative of such ability. The longest test requires but a few minutes for solution. Problems of social and scientific judgment require years for even partial solution.

A second factor, exceedingly difficult to measure, is freedom from suggestibility. Suggestion constantly tends to give undue value to certain elements that are either irrelevant or of minor importance to the judgment in question. Immediacy, social prestige, repetition, vivid sensory appeal diminish or intensify certain

## HIERARCHY OF CORRELATIONS

## Tabulation C

	Binet	Rank-Order	Vocabulary	Total Associations	Substitution, Sheet I	Directions Test	Binet Letter-Square	Analogies B	Substitution Recall	Analogies Total	Trabue	Proverbs Test	Relative Values	Simultaneous Addition	Marble Statue
B		037 778	011 940	038 773	025 852	044 730	041 752	027 870	046 721	038 770	045 720	044 742	067 605	074 452	082 386
R. O.	037 778		041 747	014 923	042 743	044 728	045 714	049 680	045 724	050 680	049 696	052 690	066 655	082 398	080 420
Voc.	011 940	041 747		038 776	056 642	051 684	035 787	054 648	061 600	029 826	055 644	052 692	082 483	082 434	084 366
Total Ass.	038 773	014 923	038 776		038 786	050 688	050 687	031 820	048 698	062 590	061 602	076 538	093 354	034 418	074 497
Sub. Sheet I	025 852	042 743	056 642	038 786		034 824	050 685	049 698	025 862	055 652	068 535	055 665	084 455	099 298	097 134
Dir. Test	044 730	044 728	051 684	050 688	034 824		055 650	021 882	052 675	063 576	069 518	082 413	091 375	093 325	086 344
B. L. Square	041 752	045 714	035 787	050 687	050 685	055 650		073 445	055 653	048 702	063 572	058 637	092 312	078 484	093 212
Anal. B.	027 870	049 680	054 648	031 820	049 698	021 882	073 445		034 807	065 551	061 594	074 502	102 205	098 223	092 246
Sub Recall	046 721	045 724	061 600	048 698	025 862	052 675	055 653	034 807		056 638	066 556	078 457	090 388	099 101	095 174
Anal. Total	038 770	050 680	029 826	062 590	055 652	063 576	048 702	065 551	056 638		068 530	057 649	103 216	099 158	096 125
Trabue	045 720	049 696	055 644	061 602	068 535	069 518	063 572	061 594	066 556	068 530		061 612	091 378	096 231	094 189
Prov. Test	044 742	052 690	051 692	076 538	055 655	082 413	058 637	074 502	078 457	057 649	061 612		087 441	105 011	099 147
Rel. Val.	067 605	066 555	082 483	093 354	084 455	091 375	092 312	102 205	090 388	103 216	091 378	087 441		097 302	098 318
Sim. Add.	074 452	082 398	082 434	034 418	099 298	093 325	078 484	098 223	079 101	099 158	096 231	105 011	097 302		097 254
M. Statue	082 386	080 420	084 366	074 497	097 134	086 344	093 212	092 246	095 174	096 125	094 184	099 147	098 318	097 254	
Av. R. O. of Av.	721 1	677 2	662 3	653 4	616 5	601 6	593 7	584 8	575 9	547 10	527 11	514 12	385 13	292 14	272 15

ideas irrespective of their pertinency to the problem in hand. Superior judgment must rise above irrelevant suggestive factors. No test measures that critical attitude towards society and self that is necessary to resist the suggestive milieu that surrounds us, and yet we have here one of the clearest lines of cleavage be-



tween the thinker and leader on the one hand and the masses on the other.

Third, clear thinking and sound judgment depend on freedom from immediate emotional attitudes. In a remote way, of course, the emotions furnish the driving force for thinking and action. Tests, at present, do not touch the emotional life.

Fourth, persistence in seeking hypotheses, in inference, and in analysis, constitute a group of factors closely akin to intelligently directed curiosity combined with exceptional mental activity and energy. Sustained effort for a period of years is often essential to the solution of social or scientific problems. Scientific attitude, vision and persistence are essential to the systematic unearthing of new problems and to their ultimate solution.

Fifth, a detached, impersonal attitude is one of the peculiar marks of the superior intellect and scientific mind. It is probably closely related to emotion, control, balance, and judgment. That such an attitude is essential to clear reasoning is obvious.

Sixth, a critical attitude towards self has already been alluded to. The ability to view one's own actions, emotions, and thoughts in relation to the causes producing them constitutes a certain check which seems essential to philosophical perspective and judgment.

All of the foregoing points constitute what might be called a comprehensive mental grasp. One can readily conceive of an efficient bank clerk or stenographer showing remarkable speed and accuracy on a wide range of mental tests, yet being entirely lacking in that broader type of judgment which is so essential to larger social and scientific problems. In contrast, it is possible to conceive of a ponderous associative type possessing superior intelligence and judgment. No series of tests has yet been devised that is even fractionally adequate to measure judgment, emotional attitudes, and critical social scientific grasp. Whether superior performance in vocabulary, mental tests, puzzles, immediate memory span for digits, immediate associative verbal span, distribution of attention, and so on, are indicative of superior intelligence, is a matter that could only be decided by follow-up work involving many years.

## CONCLUSIONS AND INTERPRETATIONS

1. The superior group, throughout, surpasses the norm group both in the Binet and the psychological tests. In the latter a cross-comparison of the norm and superior groups, age by age (see tabulations of norm and superior scores), shows clearly that the contrast decreases as age increases. In the Binet Test, the absolute number of years in advance remains more nearly constant. The I. Q.'s decrease with increase in age. (See correlations, Tabulation B.) The fifteen-year superiors, in averages, are slightly superior to the fifteen-year norm group in every test, and much superior in the majority of tests; however, it is with the younger superiors (ages six to nine) that the contrast between norm and superior averages is most noticeable. Marked individual differences from test to test are found throughout as clearly indicated in the rank-orders. The superiority of the selected group is evidenced both in the quantitative and the qualitative scores. The relatively greater superiority of the six-to-nine year subjects of the selected group is probably due to the fact that reading ability, linguistic ability, and general information impart greater uniqueness to the performance of the younger subjects; with the older subjects the handicap of the norm group has been reduced by definite training in reading (secured in the public schools from six to ten). All children who must depend upon the public schools to teach them to read are not likely to be able to gather thought from the page fluently until eight or nine years of age. This is a significant factor of advantage for the younger superiors and a handicap for the majority of children in the very nature of the social situation (often legally determined). How far-reaching this handicap is, it is difficult to say, but in the opinion of the experimenter the influence might be felt for a number of years. Furthermore, the child learning to read at home reads for content; a child in a room with fifty others is often subjected to a drill emphasizing mechanics and elocution which, conceivably, could retard the



rate of reading and delay skill in thought gathering from the printed page. The acquisition of reading ability and the habit of reading would certainly tend to greater linguistic ability, greater verbal fluency and larger and richer vocabulary.

2. The correlation coefficient between the rank-order for the Binet Tests and the rank-order average for the other psychological tests is .778, P. E., .037. This means a fairly consistent performance in the two sets of tests. In seven cases the rank-orders are very different; in three cases the Binet rank-order is higher; in four, the rank-order average. There seems to be no specific cause. A plausible accounting may be found in an analysis of the individual case. Some of the subjects are too old mentally to be adequately scored by the Binet tests.

3. The performance in the High Adult test of Binet Tests proved to be conspicuously out of harmony with the general character of the performance in the remainder of the Binet series, both qualitatively and quantitatively, and with the general estimate of the subject secured from all other sources. Three tests are primarily responsible for this: Binet Paper Cutting, Repeat 7 Digits Backwards, and Repeat 8 Digits Forward. Failure in the last two means the *loss of one whole year in mental age*. The tests would seem to measure immediate verbal memory span for digits with the added handicap of auditory presentation. At best, mechanical memory has a doubtful correlation with purported measures of intelligence, and seems to the writer to be about the last thing that could be legitimately associated with intelligence, taking any of the definitions of intelligence, commonsense, or psychological. Such tests could conceivably be related to certain clerical efficiencies. The Binet Paper Cutting places a great premium on visual imagery, and is of such a nature as not readily to permit of surrogation. It is interesting to note that 15 of the older (13, 14, and 15 year) superiors who fail in one or both of the digits tests pass both the *Repeats Thought of Passage Test* and the *Ingenuity Test*.

4. Those making conspicuously high scores in one linguistic test tend to do so in all; those making a conspicuously low score in

one, a low score in all; while the middle group seems less decided in its trends. On the whole, the general social history is contributory to, and more or less explanatory of the superior performance in all of the linguistic tests.

5. Great individual differences exist in the performance of all of the tests, so much so that it is extremely difficult to characterize what any particular test measures. There is unquestionably an increase in the use of associative and mnemonic devices with the superior subjects. Associative resourcefulness, and wealth of associations mark the performance of the peculiarly capable superior. There is evidence that imagery type does influence the score in certain tests. Whether such an imagery bias is habitual or innate is irrelevant to the question in testing, as by the very nature of the situation, readaptation of imagery is not possible in the brief time allotted to a psychological test. On the whole, the subjects possess superior mechanical memory as measured by the Binet Letter-Square, but it is to be noted that with the older subjects, especially, the high score was more often the result of resourcefulness in utilizing associative and mnemonic devices. Throughout, the subjective procedure is so varied that an appeal to the psychologizings and the qualitative character of the scores is constantly necessary.

6. In some cases the performance of certain tests is *too easy*, indicating that associative fluency has supplanted a thinking process. The child to whom the meaning of the proverb is patent finds little difficulty, while the child to whom it is foreign may give a "labored response" but highly intelligent, namely a logical instead of a purely verbal reply. The verbal-associative character of the superior response may be looked upon as resulting from facility in comprehension or it may be considered as indicative of associative habituations with meaning patent rather than deduced from the context.

7. Within the superior group there is some evidence that conspicuously high quantitative scores tend to accompany high qualitative scores, and also very low quantitative and qualitative scores are found together. This condition is less marked in



the median group, while the subjects as a whole show a low or a negative correlation in certain tests.

8. Speed and accuracy. In spite of instructions the majority of the subjects retained a certain speed or accuracy set. In Simultaneous Addition there was an attitude of nervous haste on the part of some subjects, although, on the whole, the subjects were pretty sure of themselves. Attitudes of accuracy and niceties of usage in language proved detrimental to the older superiors in the Trabue Tests, especially, and to some extent in all of the tests of a linguistic nature.

9. The capacity to keep a sustained determining tendency or problematic set is clearly shown in the Simultaneous Addition Test, Analogies, Relative Values, Proverbs, and the Association Tests. Ease and clarity in retaining the Aufgabe is an essential factor in the performance of the more intricate and sustained type of test, and in the opinion of the writer is one of the marks of the superior performance. It is one of the factors that could most plausibly be attributed to training, and would be a direct outgrowth of academic set, habituation to directed study and a definite problem, collection of errors, and finally habituation to a prolonged task. The capacity increases with the older superiors, although found in a marked degree with a few of the younger subjects. A sustained distributive attention is possibly closely related to a sustained problematic set.

10. Qualitative characteristics in the replies and attitudes of the subjects. The individual differences are too marked to warrant dividing the subjects into types, or making descriptive categories. The characteristics given here are to be understood as trends, which have occurred with sufficient frequency to warrant mention.

a. A critical attitude towards one's degree of accuracy. A subject may fail in a test, in defining a word, in nicety of judgment, and yet the reply may be relieved from taint of being unintelligent by the attitude of self-criticism on his part, and an appreciation of the exact status of his information. This qualitative characteristic is often found with failure (in terms of

scoring), and is consequently of the greatest importance in the estimation of the reagent. A subject who "knows when he knows and knows when he does not know" may show lack of training, information, skill, cleverness, rapidity of association, special talent, and so on, but one would hardly call him unintelligent. This characteristic is very pronounced with the conspicuously superior within the selected group.

b. Endurance and "stick-to-it-iveness." The selected group show marked superiority in this respect, evidenced especially in the last five-minute period of the Simultaneous Addition Test. There are, of course, marked exceptions, especially among the young subjects. VII A and VII E, for example, are far below normal in this respect. The explanation of such a characteristic is a matter of speculation: (1) It would readily fit into Spearman's "Common Fund of Energy" or "Intellective Energy" theory. (2) It could be the indirect result of abundance of energy (of a general bodily nature), due to physical trim, (nutrition, health, sensory perfection or at least correction, etc.). (3) It could be a matter of formal transfer. (4) It could be the result of an attitude towards the work (test): egotism, maintaining the reputation of being "bright," being imbued with the sacredness of school, family traditions, ambitions, prides, unquestioning docility in following any instructions, etc. (each one of these attitudes or sets, of course, has its antithesis). In the opinion of the writer all the foregoing factors are present. With the younger children and all who have established a reputation for "brightness," "4" in some phase is a powerful driving factor. "3" would make its appearance either as a result of strict pre-school academic training and tutoring or as a result of regular school training. In theory, "3" should be of relatively more importance with increased training. Certain phases of "4" are at least less obtrusive with increasing age. Finally, (5), endurance must be measured in terms of difficulty to the particular individual in question. Both judgment and careful survey of the individual factors would be necessary in attempting to determine the origin of stick-to-it-iveness in each individual case.



c. With but few exceptions, the subjects show unusual zeal in the performance of the tests. The factors again are probably those outlined in "b." In the majority of cases the subjects look upon the school and all that pertains thereto as sacred. They are typically good students.

d. In many cases there is an adult attitude of self-criticism, and criticism of others. It seems to be directly traceable in every case to having been absorbed into an adult situation.

e. Attention. There is undoubtedly superiority in distribution of attention. The complex of factors is probably similar to those mentioned in "b". The elimination of irrelevant factors and imageries with a resulting clearness of content (attention) could readily be assigned to formal training. An effortless sort of attention is found with all of the musical subjects and possibly five or six others. All but about four or five subjects attack every problem with vigor.

f. There are only two cases (XV C and XIV E) in which the subject seems to possess a detached, rational attitude and the capacity for philosophical integration. In XV C it is directly traceable to home conditions; the family of XIV E is outwardly devoid of superior philosophical attitude. XV C and XIV E are intimate friends. Both are of Jewish extraction (foreign parentage).

g. Associative resourcefulness marks the majority of test performances. This may be attributed readily to formal training, richness of experience, or to a certain innate cleverness in speed and organization of associations.

h. With the younger children, especially, associative verbal fluency has usually outstripped meanings.

II. Lack of hand-motor agility and clerical precisions are especially noticeable in the younger subjects in their writing, punctuation, four processes in arithmetic, performance in the Healy-Fernald Construction Puzzles; this is, also, the general observation of the writer while working with the subjects. Throughout, writing with practically all of the subjects is below average. Exception must be made for a few girls who are all-

round good students. Inference as to any innate tendency must be cautiously made, however; XV C, for example, is one of the worst penmen, irrespective of age. On the piano, though, he shows both agility and precision. The most plausible explanation is found in the direction of attention and training. Incidentally and directly, the training has tended to stress reading, verbal ability, and information getting. Insufficient practice in writing is probably one factor, and inattention and lack of effort are the natural sequences with the stress of training in other directions.

12. With but one exception, XIII A, all of the subjects are average or above in vocabulary. XIII A is interested solely in music, and frankly has not the slightest intention of doing any more in the school subjects than she is compelled to. The qualitative character of the meanings is excellent in a large majority of the cases. The scores are unusually high with the younger subjects, relatively much higher in relation to the norms than with the older subjects. With but few exceptions, the younger children are "great readers," (reading, literature, and general information are the subjects usually accessible to ambitious mothers). Where the vocabulary is relatively low a plausible excuse is usually found in the environment or direction of attention. (1) Where the subject has spent an inordinate amount of time in practice in music, both vocabulary and general information are somewhat affected. (2) Foreign language in the home tends to retard vocabulary and the appreciation of English idiom (illustrated in the Proverbs Test). (3) Relatively low cultural tone in the home is a retarding factor.

13. Moral prognosis. The children of the superior group, with but few exceptions, are imbedded in the traditional, orthodox environment, socially and otherwise. In many cases the subject is the only child, and usually carefully chaperoned. Morally they are good conformists, and in the opinion of the writer have sufficient social habituations and possibly social judgment to remain morally discreet. Prophecy is unsafe, but with the exception of two or three, they will probably become pillars of society. The two or three exceptions show some sus-



picious tendencies to supplant moral traditions with a thought process. Whether the subjects, in a majority of cases, are ethical in behavior and thought, is too speculative for consideration. In a large percentage of the cases the subjects will in all likelihood be absorbed into vocational and domestic complexes permitting relatively orthodox moral responses. Those going into music, if they show sufficient skill, will perhaps drift into cosmopolitan artistic circles; well-established orthodox codes could conceivably be broken down. Those who find their way into business, will be put to a severe ethical test but will probably keep within the law.

14. In several cases, a sluggish physical appearance is found concomitant with a remarkable associative speed and abundant vitality. ✓

15. With but few exceptions, the school records are excellent. Writing, drawing, and the four processes in arithmetic, punctuation and composition, are the subjects giving the most difficulty. Eleven of the subjects are all-round good students.

16. Superior health marks the group as a whole.

17. Home training. "It therefore appears to be very important to success in science that a man should have an able mother. I believe the reason to be that a child so circumstanced has the good fortune to be delivered from the ordinary narrowing partisan influences of home education . . . ." "It is, I believe, owing to the favorable conditions of their early training that an unusually large proportion of the sons of the most gifted men of science become distinguished in the same career." Galton, "Hereditary Genius," pages 196 and 197.

The essential factors in home training seem to be as follows:

a. In a large number of cases, conspicuously high scores are concomitant with definite home training, sometimes incidental but none the less definite.

b. In certain cases a *fortunate incidental situation* has seemed to be very effective in securing general information, language, verbal fluency, foreign language (especially), and vocabulary.

c. Reading, writing, and arithmetic have been secured by *very definite methods*, however incidental the acquirement may appear on the surface.

d. There is abundance of evidence that tutoring is a superior method of getting results, whatever its drawbacks from the standpoint of socializing the child.

e. In a large majority of cases, parents have *treated the children as rational beings*, and have used the same arguments and attitudes as would be used with adults. This attitude has been an essential theory of the mothers who have made a business of educating their children (usually one child). They have assumed that the child's mind is like that of an adult; that the difference is one of degree, not kind, and that rational behavior and reasoning capacity wait on experience. They treat their children as adults.

f. A mother who has devoted her time to pre-school education has usually instituted a pretty definite regimen of stuffing, and has kept a pretty close tab on the child's performance in terms of school grade. Educational plays, games, reading lists (*à la Chautauqua*), systematic presentation of general information, a full program from visits to the zoo to setting up experiments in general science, systematic use of dictionary, and so on, play a conspicuous part in the training. Such training has often been delightfully incidental and rich in concrete material, and the mother is usually to be commended for resourcefulness and cleverness in the use of plays, games, and devices.

g. While verbal fluency outstrips meaning, in the case of the child far in advance in reading, the mothers must be given credit for having anticipated the danger to some extent.

h. The nucleus of home teaching seems to be *early reading*, with emphasis placed on definite reading lists. This is an important factor as it is so closely related to vocabulary, skill in linguistic tests, knowledge of fable and myth, academic adaptations, verbal fluency, and association.

g. There is no evidence that the homes instituting the most definite pre-school cramming regimens were of superior culture, or that ancestry indicated superior heredity. It was rather the reverse, the more cultured homes depended on an incidental method of instruction.



h. The influence of language training in the home is shown in the Trabue Test. Those making low grades in Trabue tended to make low grades throughout. Home conditions, foreign language, and piano practice seem to account for lowered linguistic (English) ability. A corresponding superior group, showing superiority in the Trabue Test, are also superior in several allied tests, and have superior home conditions in language, and are "great readers."

i. What may the home learn from cases of superior home education?

(1) The situations are hardly comparable, because the school must contend with numbers; home training always has the advantage of tutoring, incidental method, more complete cultural control, and elimination of negative cultural and educational conditions. The chief advantage, in the opinion of the writer, is the superior incidental cultural situation in the home.

(2) The disadvantages of home teaching are: (a) loss of certain phases of life; (b) in certain cases, an extremely bad reaction on the child when the mother set out to make a "genius" or "prodigy."

(3) The factors in home education that the school might profitably imitate are: (a) incidental procedure, (b) viewing the child as a rational being, (c) the use of incidental rather than the elaborately formal reading methods, and (d) the beginning of reading at an early age in order to increase vocabulary and give an essential tool in the securing of information. (The advisability of "d" is extremely doubtful.)

Unfortunately, most of the superior characteristics of home training are of such a nature as to be of little advantage where large numbers of children are concerned. Often the relatively low cultural level of the teacher herself is an insurmountable factor.

18. Social status of the home. The social status of the home has proved a difficult matter to evaluate. The mores and cultures of a home are subtle and elusive; and, after all is said, characterization is largely a matter of personal opinion. The economic,

hygienic, and health conditions are more easily judged. With but few exceptions all three are of such excellence as to offer no handicap to early training and development. In a number of cases, the present economic conditions will not permit high school and college education.

The following cultural factors should be stressed:

a. There is not a single case where the home is of the highest type of scientific cultural tone.

b. In several of the homes the artistic and literary culture is very high.

c. In all but a few cases, the general cultural tone is average or above.

d. A most subtle factor is the attitude of the home towards education, school, academic accomplishment, and pride and ambition.

1. With all of the children who have been systematically stuffed, the mothers have unbounded ambition and hopes and persistence.

2. In the more cultural homes bragging and pride are, at least, more elegantly concealed, but family ambitions, definite plans for higher education, and numerous social stimulations are brought to bear. Family success and traditions are thoroughly *incorporated into immediate as well as remote motivations*.

3. In the majority of cases, school marks, making grades in school, etc., are of the greatest moment to the mothers.

4. With all of the musicians, family pride is pronounced.

19. The so-called "General Factor of Intelligence" is too highly a speculative matter to offer a general theory for the interpretation of intellectual behavior. Hierarchies of correlation may be explained by the action of specific and group factors as well as by a general factor. A general factor of intelligence needs not of necessity be innate, but can quite as readily be an all-pervading environmental factor varying in degrees of effectiveness from individual to individual. At the present time the burden of proof would seem to rest with him who makes a sweeping claim for either innate or environmental factors.



20. How shall we account for the high I. Q.'s and mental ages? The writer offers the following tentative opinions and interpretations:

a. One of the assumptions in mental testing seems to be that the tests are of such a nature that an average (median) child of a certain age, of an average (median) innate intelligence, with average (median) health, with average (median) social milieu, with average (median) opportunities, with average (median) economic conditions, with average (median) chance conditions, and so on, will make an average (median) score. Care is taken to get a true or unbiased sampling, and the score of any subject is *descriptive*, (not explanatory) in reference to an *unanalyzed median sum total* of all of the factors of performance in the *carefully unselected* norm group. The condition assumes the chance or *laissez-faire* intermingling of causes that we have operative in natural phenomena, and which cause the variates to conform to the normal or Gaussian curve of distribution. The writer has no desire, in the present discussion, to question the validity of the assumption. The group under consideration is not a chance sampling but a highly selected group. Consequently in any individual case, we must look to see just which factors are above average (median) in character. Where we have a fortunate blending of superior health, stimulating cultural conditions, superior innate ability, and so on, we should anticipate a higher score than where all factors remain average (median). The excellence of any factor or group of factors could conceivably inflate the mental age and consequently the I. Q.

The importance to be attached to any factor will always be relative to the importance attached to each of the other factors. *An appeal to the case history with each subject* is the only possible method of estimating the significance of any one element. Whether health; economic advantage, superior cultural setting, training, being a greater reader, innate ability, or whatnot, alone or in combination, is chiefly responsible for the mental age rising above the median is, of course, a matter of speculation. Given average native ability, a sum total of factors, consisting in su-

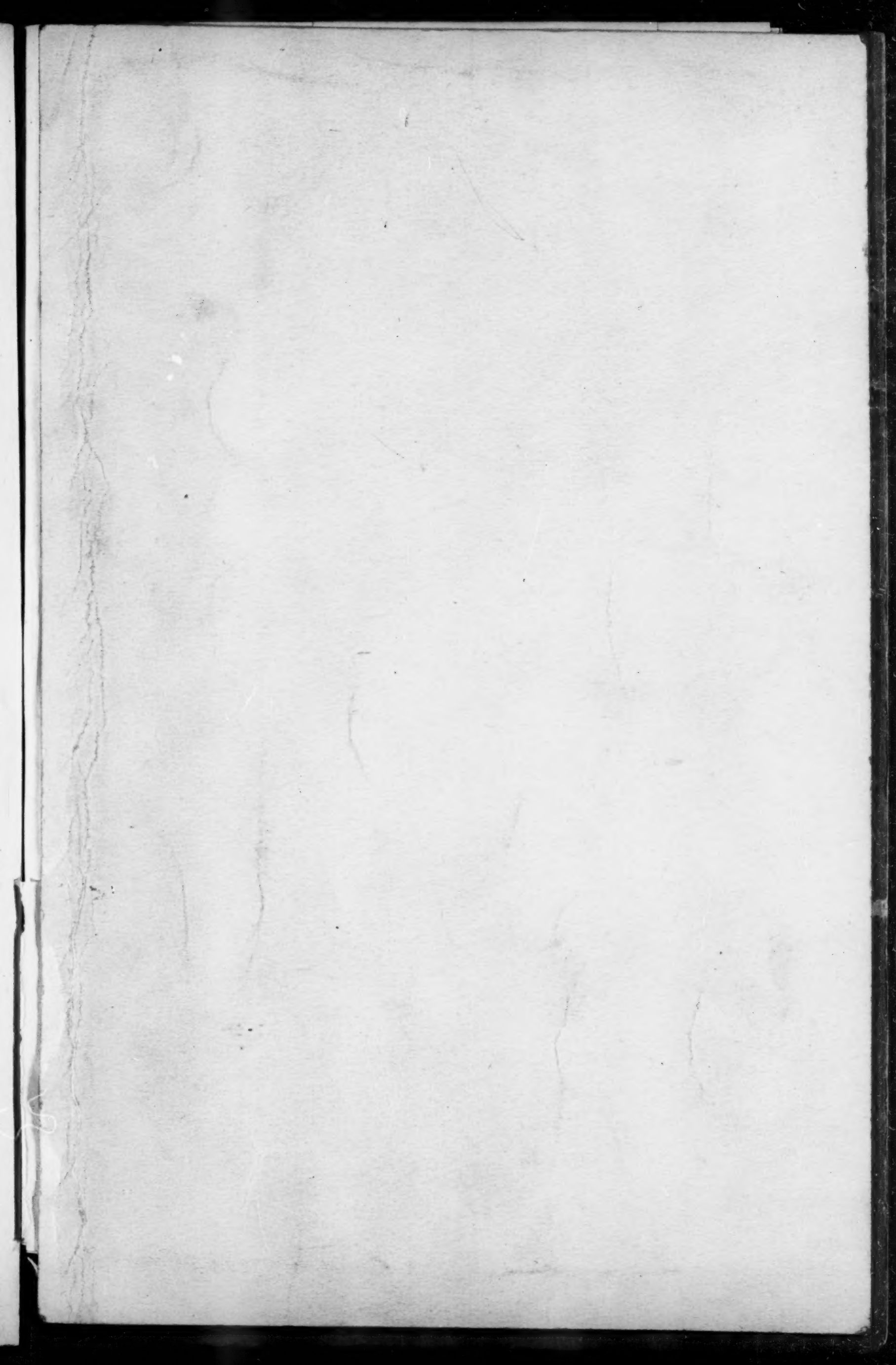
perior training, health, social milieu, and so on, could readily inflate practically all performances. The superiority of the present group in health and in certain phases of training and environment, is in most cases a fact beyond dispute; native ability much beyond average is a matter of speculation. The writer believes there is a degree of innate superiority in nearly every case, and in many cases a marked degree of superiority.

21. Have we genius in any case? There is nothing in the nature of any of the tests used to warrant assertion of superiority beyond immediate cleverness.<sup>1</sup> The estimates of musically gifted children by critics is in terms of performance, and no claim is made that they will make composers. Custom, at least, seems to have retained the expression of musical genius for those who have left some permanent records. The writer conceives genius as possessing but the same characteristics we all possess only in a markedly superior degree; and while it seems to him that the evidence warrants attributing some superior innate ability to a very great majority of the cases presented here, more than that he cannot say. Genius must be conceived as being the result of a peculiarly fortunate blending of ability, temperament, character, opportunity, and the stamp of social approval.<sup>2</sup>

<sup>1</sup> Mercier, C., *Human Temperaments*, see essay on "Cleverness and Capability." 1917.

<sup>2</sup> Todd, Arthur James, *Theories of Social Progress*, Chs. XXVI and XXVII on "Great Men, Heroes, The Elite." 1918.





Attention Test																
5 Minutes						10 Minutes					15 Minutes					
Case Number	Number Additions	Number Errors	Number Lapses	Number Mistakes	No. Correct Additions	Number Additions	Number Errors	Number Lapses	Number Mistakes	No. Correct Additions	Number Additions	Number Errors	Number Lapses	Number Mistakes	No. Correct Additions	Number Additions
VI																
A-6-5	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
VII																
A-6-8	42	4	0	4	38	..	..	..	..	..	..	..	..	..	..	..
B-6-9	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
C-7	75	3	7	10	65	..	..	..	..	..	..	..	..	..	..	..
D-7	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
E-7-2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
F-7-2	45	3	6	9	36	36	5	6	11	25	36	2	1	3	33	117
G-7-3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
VIII																
A-8	96	10	0	10	86	81	13	0	13	68	87	13	0	13	74	264
B-8-2	63	2	0	2	61	42	4	6	10	32	30	7	4	11	19	135
C-8-6	63	4	9	13	50	39	7	7	14	25	33	4	10	14	19	135
IX																
A-8-II	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
B-9-3	87	17	0	17	70	48	8	0	8	40	39	18	0	18	21	174
C-9-4	84	7	0	7	77	48	7	0	7	41	57	8	3	11	46	189
D-9-3	54	3	7	10	44	21	2	9	11	10	39	3	5	8	31	114
X																
A-9-10	75	4	0	4	71	45	7	3	10	35	42	10	0	10	32	162
B-10-1	75	18	0	18	57	54	20	0	20	34	51	13	0	13	38	180
C-10-1	75	9	0	9	66	66	4	0	4	62	69	7	0	7	62	210
D-10-2	60	9	0	9	51	33	14	0	14	19	33	15	0	15	18	126
E-9-10	60	5	0	5	55	36	9	2	11	25	36	6	0	6	30	132
XI																
A-11-3	63	11	0	11	52	42	13	1	14	28	48	14	0	14	34	152
B-11-3	96	6	8	14	82	81	3	3	6	75	87	3	3	6	81	264
XII																
A-11-9	87	7	2	9	78	60	15	1	16	44	69	10	0	10	59	216
B-12-1	72	2	0	2	70	48	3	0	3	45	75	4	2	6	69	195
C-12-2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
D-12-3	90	7	6	13	77	60	9	9	18	42	57	13	0	13	44	207
E-12-4	111	7	6	13	98	63	3	3	6	57	84	5	1	6	78	258
F-12-3	90	9	0	9	81	120	10	0	10	110	117	7	1	8	109	327
XIII																
A-12-7	165	15	0	15	150	132	17	0	17	115	165	10	0	10	155	462
B-12-8	120	23	3	26	94	87	15	0	15	72	126	10	0	10	116	333
C-12-9	156	16	3	19	137	132	7	5	12	120	168	7	0	7	161	456
D-13	102	8	0	8	94	87	8	3	11	76	81	8	4	12	69	270
E-13-6	120	10	3	13	107	96	8	0	8	88	108	5	7	12	96	324
F-12-10	93	8	5	13	80	78	13	4	17	61	105	6	1	7	98	276
G-13-3	72	4	0	4	68	183	9	0	9	174	186	7	0	7	179	441
H-13-6	129	8	3	11	118	120	5	0	5	115	129	14	1	15	114	378
XIV																
A-13-10	120	13	0	13	107	78	9	0	9	69	87	10	0	10	77	285
B-13-11	111	11	4	15	96	96	7	3	10	86	81	2	8	10	71	288
C-13-11	84	12	1	13	71	75	21	1	22	53	81	17	0	17	64	240
D-14	96	14	2	16	80	81	6	0	6	75	84	14	2	16	68	261
E-14-1	222	2	0	2	220	150	5	0	5	145	199	0	0	0	199	571
F-14-3	108	13	0	13	95	84	8	0	8	76	90	8	0	8	82	282
G-14-4	177	3	2	5	172	168	4	1	5	163	171	5	0	5	166	516
H-14-4	90	10	5	15	75	48	7	2	9	39	57	7	1	8	49	195
I-14-6	141	9	0	9	132	114	11	0	11	103	129	3	0	3	126	384
XV																
A-14-9	78	6	6	12	66	60	5	7	12	48	63	4	0	4	59	201
B-14-10	84	14	0	14	70	51	3	4	7	44	63	1	5	6	57	198
C-14-11	93	8	4	12	81	75	9	0	9	66	96	7	8	15	81	264
D-15	123	3	0	3	120	105	6	0	6	99	142	6	0	6	136	370
E-15	210	9	0	9	201	243	3	0	3	240	243	0	0	0	243	606
F-15-5	126	5	0	5	121	147	2	0	2	145	123	6	0	6	117	396
G-15-6	120	5	1	6	114	93	5	8	13	80	84	5	1	6	78	297
H-15-1	132	8	3	11	121	108	6	2	8	100	126	3	3	6	120	366



TABULATION I

Totals						Substitution Test										Total	
Number Additions	Number Errors	Number Lapses	Number Mistakes	No. Correct Additions	Time				% Accuracy				Recall % Accuracy		Total		
					I	II	III	IV	I	II	III	IV	I	II			
..	..	..	..	..	16:10					97				44	...		
..	..	..	..	..	6:49	6:03	10:16	6:03	100	100	100	100	44	100			
..	..	..	..	..	....	....	....	....	...	...	...	...	...	...	...		
..	..	..	..	..	8:35	6:12	6:28	6:18	95	99	97	97	100	...	...		
..	..	..	..	..	....	....	....	....	...	...	...	...	...	...	...		
117	10	13	23	94	14:36	12:30	12:17	9:02	100	100	99	98	30	30			
..	..	..	..	..	13:32	10:55	12:05	12:20	99	100	99	100	100	100			
..	..	..	..	..	7:27	5:29	6:00	6:25	99	99	98	89	100	100			
264	36	0	36	228	7:01	5:17	5:50	4:53	100	96	100	100	66	66			
135	13	10	23	112	9:32	6:57	5:30	5:32	100	100	100	100	78	100			
135	15	26	41	94	9:51	7:17	10:20	9:30	99	100	100	100	78	100			
..	..	..	..	..	10:15	5:15	4:50	5:02	100	100	99	100	100	...	...		
174	43	0	43	131	9:10	5:45	5:01	5:56	99	100	100	100	100	...	...		
189	22	3	25	164	6:50	5:30	4:50	4:50	100	100	100	100	100	...	...		
114	8	21	29	85	5:56	3:24	3:38	3:35	100	100	98	99	89	...	...		
162	21	3	24	138	5:15	5:18	5:10	6:15	92	96	100	99	89	...	...		
180	51	0	51	129	4:25	3:25	3:00	3:17	99	99	100	100	100	...	...		
210	20	0	20	180	4:50	4:41	4:00	4:19	100	100	100	100	100	...	...		
126	38	0	38	88	5:12	4:52	5:38		99	100	99	...	100	...	...		
132	20	2	22	110	7:50	5:21	6:45	8:16	100	100	100	100	100	...	...		
152	38	1	39	114	5:20	3:35	3:02	3:00	98	100	99	99	89	100			
264	12	14	26	238	2:15	2:05	2:40	2:30	100	100	100	100	100	...	...		
216	32	3	35	181	4:20	3:04	2:38	3:10	100	100	100	100	100	...	...		
195	9	2	11	184	3:05	2:20	2:00	1:45	100	100	100	100	100	...	...		
..	..	..	..	..	4:05	3:17	3:18	4:02	100	99	96	100	100	...	...		
207	29	15	44	163	3:31	2:42	2:29	2:38	99	100	99	100	100	...	...		
258	15	10	25	233	3:39	3:05	3:50	3:00	98	100	98	99	100	...	...		
327	26	1	27	300	3:55	3:03	3:11	3:29	100	100	100	100	100	...	...		
462	42	0	42	420	4:06	2:57	2:14	2:29	98	100	97	100	100	...	...		
333	48	3	51	282	4:32	2:37	2:00	2:00	99	100	100	100	67	78			
456	30	8	38	418	4:23	3:59	2:51	3:10	98	98	100	100	100	...	...		
270	24	7	31	239	3:43	2:46	2:21	3:26	100	100	100	100	100	...	...		
324	23	10	33	291	4:47	3:08	4:33	4:47	98	100	100	100	100	...	...		
276	27	10	37	239	3:17	2:36	2:36	2:25	98	100	100	100	100	...	...		
441	20	0	20	421	3:38	4:01	3:52	3:58	97	100	98	99	78	...	...		
378	27	4	31	347	3:20	2:55	2:35	2:49	100	100	100	100	89	...	...		
285	32	0	32	253	4:30	3:05	2:35	3:10	97	100	99	100	100	...	...		
288	20	15	35	253	3:10	3:03	2:20	2:30	99	95	78	80	100	...	...		
240	50	2	52	188	4:17	3:36	4:17	2:47	99	100	100	100	100	...	...		
261	34	4	38	223	3:26	2:40	2:02	3:04	100	100	100	100	100	...	...		
571	7	0	7	564	4:28	3:54	5:32	5:33	100	100	88	79	100	...	...		
282	29	0	29	253	2:56	2:48	2:28	2:54	100	100	100	100	100	...	...		
516	12	3	15	501	3:41	2:35	2:29	2:21	100	99	100	100	100	...	...		
195	24	8	32	163	3:35	3:03	2:44	2:44	100	100	99	99	100	...	...		
384	23	0	23	361	2:52	2:32	2:30	2:14	100	100	100	100	100	...	...		
201	15	13	28	173	3:40	2:45	2:31	2:34	100	99	100	100	100	...	...		
198	18	9	27	171	5:13	2:37	2:50	3:02	97	98	98	100	100	...	...		
264	24	12	36	228	3:44	2:54	2:42	2:34	98	99	100	100	100	...	...		
370	15	0	15	355	3:31	2:31	2:40	2:06	100	97	100	100	100	...	...		
696	12	0	12	684	2:17	1:55	1:48	1:29	100	100	100	99	100	...	...		
396	13	0	13	383	3:00	2:08	2:01	2:02	100	99	100	100	100	...	...		
297	15	10	25	272	4:27	4:01	4:41	3:13	100	100	100	100	100	...	...		
366	17	8	25	341	4:41	3:18	3:15	3:20	100	100	100	97	78	...	...		

TABULATION I											Substitution Test						
15 Minutes					Totals												
Additions	Number Errors	Number Lapses	Number Mistakes	No. Correct Additions	Number Additions	Number Errors	Number Lapses	Number Mistakes	No. Correct Additions	Time	Time	Time	Time	% Accuracy	% Accuracy	% Accuracy	
										I	II	III	IV	I	II	III	
..	..	..	..	..	..	..	..	..	..	16:10				97			
..	..	..	..	..	..	..	..	..	..	6:49	6:03	10:16	6:03	100	100	100	
..	..	..	..	..	..	..	..	..	..	....	....	....	....	...	...	...	
..	..	..	..	..	..	..	..	..	..	8:35	6:12	6:28	6:18	95	99	97	
..	..	..	..	..	..	..	..	..	..	....	....	....	....	...	...	...	
6	2	1	3	33	117	10	13	23	94	14:36	12:30	12:17	9:02	100	100	99	
..	..	..	..	..	..	..	..	..	..	13:32	10:55	12:05	12:20	99	100	99	
..	..	..	..	..	..	..	..	..	..	7:27	5:29	6:00	6:25	99	99	98	
7	13	0	13	74	264	36	0	36	228	7:01	5:17	5:50	4:53	100	96	100	
0	7	4	11	19	135	13	10	23	112	9:32	6:57	5:30	5:32	100	100	100	
3	4	10	14	19	135	15	26	41	94	9:51	7:17	10:20	9:30	99	100	100	
9	18	0	18	21	174	43	0	43	131	10:15	5:15	4:50	5:02	100	100	99	
7	8	3	11	46	189	22	3	25	164	9:10	5:45	5:01	5:56	99	100	100	
9	3	5	8	31	114	8	21	29	85	6:50	5:30	4:50	4:50	100	100	100	
										5:56	3:24	3:38	3:35	100	100	98	
2	10	0	10	32	162	21	3	24	138	5:15	5:18	5:10	6:15	92	96	100	
1	13	0	13	38	180	51	0	51	129	4:25	3:25	3:00	3:17	99	99	100	
9	7	0	7	62	210	20	0	20	180	4:50	4:41	4:00	4:19	100	100	100	
3	15	0	15	18	126	38	0	38	88	5:12	4:52	5:38		99	100	99	
6	6	0	6	30	132	20	2	22	110	7:50	5:21	6:45	8:16	100	100	100	
8	14	0	14	34	152	38	1	39	114	5:20	3:35	3:02	3:00	98	100	99	
7	3	3	6	81	264	12	14	26	238	2:15	2:05	2:40	2:30	100	100	100	
9	10	0	10	59	216	32	3	35	181	4:20	3:04	2:38	3:10	100	100	100	
5	4	2	6	69	195	9	2	11	184	3:05	2:20	2:00	1:45	100	100	100	
..	..	..	..	..	..	..	..	..	..	4:05	3:17	3:18	4:02	100	99	96	
7	13	0	13	44	207	29	15	44	163	3:31	2:42	2:29	2:38	99	100	99	
4	5	1	6	78	258	15	10	25	233	3:39	3:05	3:50	3:00	98	100	98	
7	7	1	8	109	327	26	1	27	300	3:55	3:03	3:11	3:29	100	100	100	
5	10	0	10	155	462	42	0	42	420	4:06	2:57	2:14	2:29	98	100	97	
6	10	0	10	116	333	48	3	51	282	4:32	2:37	2:00	2:00	99	100	100	
8	7	0	7	161	456	30	8	38	418	4:23	3:59	2:51	3:10	98	98	100	
31	8	4	12	69	270	24	7	31	239	3:43	2:46	2:21	3:26	100	100	100	
8	5	7	12	96	324	23	10	33	291	4:47	3:08	4:33	4:47	98	100	100	
5	6	1	7	98	276	27	10	37	239	3:17	2:36	2:36	2:25	98	100	100	
6	7	0	7	179	441	20	0	20	421	3:38	4:01	3:52	3:58	97	100	98	
9	14	1	15	114	378	27	4	31	347	3:20	2:55	2:35	2:49	100	100	100	
37	10	0	10	77	285	32	0	32	253	4:30	3:05	2:35	3:10	97	100	99	
31	2	8	10	71	288	20	15	35	253	3:10	3:03	2:20	2:30	99	95	78	
31	17	0	17	64	240	50	2	52	188	4:17	3:36	4:17	2:47	99	100	100	
34	14	2	16	68	261	34	4	38	223	3:26	2:40	2:02	3:04	100	100	100	
99	0	0	0	199	571	7	0	7	564	4:28	3:54	5:32	5:33	100	100	88	
90	8	0	8	82	282	29	0	29	253	2:56	2:48	2:28	2:54	100	100	100	
71	5	0	5	166	516	12	3	15	501	3:41	2:35	2:29	2:21	100	99	100	
57	7	1	8	49	195	24	8	32	163	3:35	3:03	2:44	2:44	100	100	99	
29	3	0	3	126	384	23	0	23	361	2:52	2:32	2:30	2:14	100	100	100	
63	4	0	4	59	201	15	13	28	173	3:40	2:45	2:31	2:34	100	99	100	
63	1	5	6	57	198	18	9	27	171	5:13	2:37	2:50	3:02	97	98	98	
96	7	8	15	81	264	24	12	36	228	3:44	2:54	2:42	2:34	98	99	100	
42	6	0	6	136	370	15	0	15	355	3:31	2:31	2:40	2:06	100	97	100	
43	0	0	0	243	696	12	0	12	684	2:17	1:55	1:48	1:29	100	100	100	
23	6	0	6	117	396	13	0	13	383	3:00	2:08	2:01	2:02	100	99	100	
84	5	1	6	78	297	15	10	25	272	4:27	4:01	4:41	3:13	100	100	100	
26	3	3	6	120	366	17	8	25	341	4:41	3:18	3:15	3:20	100	100	100	



Test

Letter-Square Marble Statue

% Accuracy III	% Accuracy IV	Recall % Accuracy I	Recall % Accuracy II	Total	Average No. Letters	Number Ideas
		44	...	99	3.3	34
100	100	44	100	45	4.8	29
...	...	...	...	68	2.3	..
97	97	100	...	140	4.7	34
...	...	...	...	90	3	..
99	98	30	30	124	4.1	..
99	100	100	100	78	2.6	43
98	89	100	100	138	4.6	34
100	100	66	66	191	6.4	38
100	100	78	100	108	3.6	47
100	100	78	100	124	4.1	34
99	100	100	...	153	5.1	28
100	100	100	...	181	6	21
100	100	100	...	180	6	44
98	99	89	...	141	4.7	38
100	99	89	...	175	5.8	37
100	100	100	...	201	6.7	42
100	100	100	...	236	7.9	32
99	...	100	...	107	3.6	36
100	100	100	...	172	5.7	30
99	99	89	100	217	7.2	52
100	100	100	...	284	9.5	26
100	100	100	...	262	8.75	38
100	100	100	...	270	9	43
96	100	100	...	188	6.3	..
99	100	100	...	204	6.8	37
98	99	100	...	344	11.5	36
100	100	100	...	224	7.5	29
97	100	100	...	242	8.1	36
100	100	67	78	333	11.1	..
100	100	100	...	331	11	43
100	100	100	...	203	6.8	38
100	100	100	...	303	10.1	55
100	100	100	...	229	7.6	38
98	99	78	...	225	7.5	34
100	100	89	...	199	6.6	43
99	100	100	...	255	8.5	38
78	80	100	...	293	9.8	41
100	100	100	...	220	7.3	38
100	100	100	...	340	11.3	33
88	79	100	...	277	9.2	32
100	100	100	...	214	7.1	36
100	100	100	...	235	7.8	48
99	99	100	...	240	8	41
100	100	100	...	316	10.5	40
100	100	100	...	203	6.8	40
98	100	100	...	144	4.8	40
100	100	100	...	218	7.3	39
100	100	100	...	280	9.3	44
100	99	100	...	312	10.4	52
100	100	100	...	340	11.3	39
100	100	100	...	260	8.7	46
100	97	78	...	256	8.5	40

TABULATION I

1. Attention (Simultaneous Addition)
2. Substitution
3. Letter-Square
4. Marble Statue



Case and Age	VIII								IX						
	1	2	3	4	5	6	al1	al2	1	2	3	4	5	6	al1
	Ball and Field	20-0	Comprehension	Similarities	Definition	Vocabulary	Six Coins	Dictation	Date	Weights	Make Change	4 Digits Backwards	Three Words	Rhymes	Months
VI			a+ b+	a+ b+ c+ d+											
A-6-5	+	+	c+	d+	+	+	+	+	+	+	+	+	+	+	+
VII															
A-6-8	+	+	+	a-	+	24 +	+	+	+	+	+	+	+	+	+
B-6-9	+	+	a-	+	+	+	+	+	a+ —	a- +	+	—	+	+	—
C-7	+	+	+	+	+	+	+	0	+	+	+	+	+	+	+
D-7	+	+	+	d+ —	+	20	+	+	+	+	+	—	+	+	—
E-7-2	+	—	+	+	+	+	+	+	+	+	+	+	+	+	+
F-7-2	+	+	+	+	+	+	+	+	+	—	+	+	c- +	+	+
G-7-3	+	+	+	a- +	+	+	+	+	+	+	+	+	+	f+ +	+
VIII															
A-8	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
B-8-2	+	+	+	+	+	+	+	0	+	+	+	+	+	+	+
C-8-6	—	+	+	+	+	+	+	+	+	+	+	+	+	+	+
IX															
A-8-11	+	+	+	+	+	+	+	0	+	+	+	+	+	+	+
B-9-3									+	+	+	+	+	+	+
C-9-4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
D-9-3									+	+	+	+	+	+	+
X															
A-9-10									+	+	+	+	+	+	+
B-10-1									+	+	+	+	+	+	+
C-10-1									+	+	+	+	+	+	+
D-10-2									+	+	+	+	+	+	+
E-9-10									+	+	+	+	+	+	+
XI															
A-11-3									+	+	+	+	+	+	+
B-11-3															
XII															
A-11-9									+	+	+	+	+	+	+
B-12-1															
C-12-2															
D-12-3															
E-12-4															
F-12-3															
XIII															
A-12-7									+	+	+	+	+	+	+
B-12-8															
C-12-9															
D-13-6															
E-13-6															
F-12-10															
G-13-3															
H-13-6															
XIV															
A-13-10															
B-13-11															
C-13-11															
D-14															
E-14-1															
F-14-3															
G-14-4															
H-14-4															
I-14-6															
XV															
A-14-9															
B-14-10															
C-14-11															
D-15															
E-15															
F-15-5															
G-15-6															
H-15-1															

No tests failed below the VIII year.



TABULATION II  
Binet Tests (Stanford Revision)

[illegible]



TABULATION II  
Binet Tests (Stanford Revision)

XII								XIV								
1	2	3	4	5	6	7	8	1	2	3	4	5	6	al	1	2
Vocabulary	Abstract Words	Ball and Field	Dissected Sentences	Tables	Repeat 5 Digits Backwards	Pictures Interpretation	Similarities	Vocabulary	Induction	President and King	Problems of Fact	Arithmetical Reasoning	Clock	Repeat 7 Digits	Vocabulary	Interpretation of Fables
-	-	+	+	-	-	+	+	-	-	-	-	-	-	-	-	-
-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-
47	+	-	-	-	-	+	+	-	-	-	-	-	-	-	-	-
-	-	+	+	-	-	-	-	-	+	-	-	-	-	-	-	-
-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-
45	-	+	+	-	+	+	+	-	-	-	-	-	-	-	-	-
-	+	+	+	-	+	+	+	-	-	-	-	-	-	+	-	-
-	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-
+	+	+	+	+	+	+	+	61	+	-	-	+	+	+	-	+
-	+	+	+	+	+	+	+	-	-	-	-	+	-	+	-	+
43	+	-	+	+	+	+	+	-	+	-	-	-	+	-	-	-
43	+	+	+	+	+	+	+	-	-	+	+	+	-	-	-	+
48	+	+	+	+	+	+	+	-	-	-	+	+	+	+	-	+
+	+	+	+	+	+	+	+	+	-	-	+	+	-	-	71	+
-	+	+	-	+	+	+	+	-	-	-	-	+	-	-	-	-
+	+	+	+	+	-	+	+	+	-	+	+	+	-	+	64	+
42	+	+	+	+	+	+	+	-	+	+	+	+	+	-	-	+
+	+	+	+	+	+	+	+	+	-	+	+	+	+	-	+	+
-	-	+	+	+	-	+	+	-	+	-	+	+	+	-	-	-
+	+	+	+	+	+	+	+	53	+	+	+	+	-	-	-	+
47	+	+	+	+	+	+	+	-	+	+	+	+	-	-	-	+
+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	65	+
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	65	+
+	+	+	+	+	+	+	+	55	+	+	+	+	+	+	-	+
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	69	+
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
+	+	+	+	+	+	+	+	53	+	+	+	+	+	+	-	+
46	+	-	+	+	+	+	+	-	-	-	+	+	+	+	-	-
+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	64	+
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	72	+
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	65	+
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	68	+
+	+	+	+	+	+	+	+	+	-	+	+	+	+	+	+	+
+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	65	+
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	72	+
+	+	+	+	+	+	+	+	51	+	+	+	+	+	-	-	-
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
+	+	+	+	+	+	+	+	60	+	+	+	+	+	+	-	+
+	+	+	+	+	+	+	+	60	+	+	+	+	+	+	-	+
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	65	+
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	65	+
+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	67	+
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	70	+
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	65	+



	XVI						XVIII						Mental Age	Age in Advance	I. Q.
	3	4	5	6	al1	al2	1	2	3	4	5	6			
of Fables	Difference between Abstract Words	Problem of Enclosed Boxes	Repeat 6 Digits Backwards	Code	Repeat 28 Syllables	Comprehension of Phys. rel.	Vocabulary	Binet Paper-cutting	Repeat 8 Digits	Repeat thoughts of passages heard	Repeat 7 Digits Backwards	Ingenuity Tests			
													11	4-7	172.7
													10-8	4	160
		+											11-2	4-5	165.4
		+											11-6	4-6	164.3
													9-5	2-5	134.5
		+											12	4-10	167.4
													11-6	4-4	160.5
													9-11	2-8	136.8
													16	8	200
													12-6	4-4	153
		+											13-1	4-7	153.9
													13-6	4-7	151.4
		+											14-6	5-3	156.8
		+											15-6	6-2	166
													12-4	3-1	133
													14-11	5-1	151.7
		+											15-5	5-4	152.9
		+					75	+					17-8	7-7	175.2
													11-8	1-6	114.8
													14-1	4-3	143.2
		+											14-2	2-11	125.9
		+											16-10	5-7	149.6
		+					84	+					18-6	6-9	157.4
		+						+					18-6	6-5	153.1
								+					16-8	4-6	136.9
								+					18-1	5-10	147.6
							84						18-6	6-2	150
								+					16-10	4-7	137.4
													14-8	2-1	116.6
													15-10	3-2	125
													18-1	5-4	141.8
							75	+					18-6	5	137
							82	+					19	5-6	140.7
													17	4-2	132.5
													17-7	4-4	132.7
							83						18-4	4-10	135.8
													18	4-2	130.1
													18-6	4-7	132.9
													16-10	2-11	121
							78						18-7	4-7	132.7
													18-7	4-6	132
													17-7	3-4	123.4
													18-7	4-3	129.6
							75	+					18-6	4-2	129
							76						17-6	3	120.7
													18	3-3	122
													18-1	3-3	121.9
													18-6	3-7	124
							83	+					19-2	4-2	127.8
							76	+					19-6	4-6	130
							81	+					19-6	4-1	126.5
							79	+					19	3-6	127.6
													17-2	2-1	113.8



TABULATION III

Case Number	Associations in 1 Minute						Directions Test						Trabue		
	Opposites		Part-Whole		Genus-Species		A		B		C		B		
	Correct Associations	Errors	Correct Associations	Errors	Correct Associations	Errors	Time	Errors	Time	Errors	Time	Errors	Time	Score	Time
VI															
A-6-5	8	0	9	2	6	1	2:45	2	2:53	3	4:37	3	7:00	15	7:00
VII															
A-6-8	9	0	10	2	4	3	3:15	2	3:43	2	7:18	0	3:47	8	3:50
B-6-9	..	..	9	2	4	3	4:41	3	3:17	3	....	..	....	..	....
C-7	18	2	11	4	6	4	3:35	0	5:10	0	5:23	0	7:00	10	3:05
D-7	7	4	5	2	6	1	3:49	1	3:36	0	....	..	....	..	....
E-7-2	14	1	5	0	4	0	4:07	2	4:10	0	6:55	0	6:00	10	7:00
F-7-2	9	1	11	1	10	1	4:46	2	4:08	2	6:20	1	7:00	12	7:00
G-7-3	9	5	9	2	6	0	2:58	2	2:43	2	5:17	7	5:47	1	7:00
VIII															
A-8	18	1	17	2	14	1	1:25	0	1:15	1	2:25	3	3:10	12	3:45
B-8-2	13	1	12	0	9	1	2:34	0	2:40	1	4:51	0	7:00	8	6:40
C-8-6	11	3	11	2	15	0	2:52	1	3:14	2	4:11	0	4:03	13	5:31
IX															
A-8-11	13	4	10	3	..	..	2:29	0	3:12	1	7:50	2	7:00	12	6:35
B-9-3	12	2	8	0	17	0	1:55	4	3:15	11	4:17	8	3:13	14	6:35
C-9-4	16	1	17	0	16	0	2:07	0	1:58	0	2:35	0	6:15	16	7:00
D-9-3	9	3	11	1	6	2	3:17	0	2:35	0	3:44	0	7:00	14	7:00
X															
A-9-10	17	1	18	0	16	0	2:14	2	2:09	0	2:57	1	7:00	13	7:00
B-10-1	17	3	19	1	15	0	3:01	0	2:12	1	2:45	1	2:35	17	3:53
C-10-1	10	0	11	2	18	0	2:10	0	1:58	1	3:14	1	4:20	14	7:00
D-10-2	8	2	8	1	15	1	2:09	2	2:55	2	2:47	2	5:17	12	3:42
E-9-10	11	1	12	1	8	1	2:52	1	2:28	1	4:10	1	3:50	14	4:07
XI															
A-11-3	19	1	15	4	19	1	1:31	2	1:49	0	2:29	2	2:01	17	2:16
B-11-3	17	1	20	0	20	0	1:40	0	2:00	2	1:31	0	2:09	16	3:43
XII															
A-11-9	20	0	19	1	20	0	1:03	1	1:34	0	2:21	1	3:30	16	4:54
B-12-1	20	0	18	2	20	0	1:32	1	1:14	3	2:14	2	2:32	17	7:00
C-12-2	18	2	18	2	18	1	1:15	0	1:20	0	2:39	2	4:30	15	5:45
D-12-3	20	0	19	0	20	0	1:06	0	:59	0	1:39	1	1:57	17	5:19
E-12-4	20	0	19	1	20	0	1:20	0	1:05	0	2:12	1	2:35	16	5:20
F-12-3	19	1	15	2	19	1	1:27	0	1:24	1	2:47	1	3:52	15	4:02
XIII															
A-12-7	19	1	16	4	15	4	2:20	1	2:01	1	2:27	6	:59	12	1:17
B-12-8	16	4	11	1	12	0	1:20	0	1:19	2	1:57	3	2:57	9	3:10
C-12-9	20	0	20	0	20	0	1:46	1	1:45	0	1:59	0	3:51	17	5:36
D-13	19	1	18	2	13	0	1:34	0	1:22	0	2:35	0	7:00	11	7:00
E-13-6	20	0	18	2	20	0	1:07	0	1:15	0	2:03	0	2:02	17	5:52
F-12-10	20	0	15	1	19	1	1:36	0	1:37	1	2:09	1	7:00	10	7:00
G-13-3	19	1	20	0	13	2	1:03	0	1:01	1	1:31	2	4:54	12	3:08
H-13-6	20	0	20	0	19	0	1:32	0	1:12	0	2:18	0	2:40	19	6:56
XIV															
A-13-10	20	0	19	0	20	0	1:17	0	1:15	0	2:25	0	4:04	16	5:47
B-13-10	18	1	20	0	20	0	1:17	1	1:28	1	2:01	2	3:17	12	4:03
C-13-11	17	1	15	0	20	0	2:09	0	1:59	1	3:10	0	3:46	10	7:00
D-14	19	1	20	0	20	0	2:42	1	1:37	1	2:15	1	6:35	18	6:42
E-14-1	17	1	15	2	16	1	1:31	0	1:17	0	2:26	1	7:00	15	7:00
F-14-3	19	1	18	1	20	0	1:05	0	1:10	0	1:49	0	7:00	16	3:10
G-14-4	20	0	16	1	20	0	1:25	0	1:31	0	2:08	2	7:00	14	7:00
H-14-4	19	1	20	0	11	2	2:15	0	2:00	0	4:43	0	4:42	18	4:26
I-14-6	20	0	20	0	20	0	1:10	0	1:12	0	1:55	0	4:00	15	7:00
XV															
A-14-9	17	3	19	0	20	0	1:38	0	1:42	0	2:32	1	7:00	14	7:00
B-14-10	20	0	19	0	20	0	1:57	0	1:42	0	3:17	1	7:00	16	6:20
C-14-11	20	0	20	0	20	0	1:31	1	1:29	0	2:25	1	3:27	13	5:45
D-15	19	1	20	0	20	0	1:15	0	1:06	0	2:47	4	3:04	18	7:00
E-15	20	0	19	0	20	0	:54	0	:56	0	1:28	0	6:34	14	6:07
F-15-5	20	0	19	0	20	0	1:34	0	1:12	0	2:00	0	7:00	14	7:00
G-15-6	19	1	16	0	15	0	1:31	0	1:37	0	2:24	0	7:00	16	7:00
H-15-1	20	0	20	0	20	0	2:02	0	1:37	0	3:21	3	3:35	14	5:50

\*Small figures indicate number of seconds where test is performed in less than 1 minute.



C		Analogies											
		A				B				C			
Score		Total Time	Average Time	Median Time	Errors	Total Time	Average Time	Median Time	Errors	Total Time	Average Time	Median Time	Errors
10	10	96.5	4.8	2	1	118.5	5.9	3	6.5	134.5	6.7	5	16
10	10	95.5	4.8	6.3	3.5	238.5	12.0	8.5	7	271.5	13.6	13.5	16
..	..	83	4.2	4	8	115.5	5.8	5	6	125	6.3	5	15
12	12	100	5	4.3	1	132.5	6.6	6	7	206.5	10.3	10	17
..	..	....	....	....	....	....	....	....	....	....	....	....	....
12	12	47.5	4.9	4	0	133.5	6.7	6.5	4	317.5	15.9	16	11
8	8	171.5	8.6	6.8	4	168	8.4	7.3	11	162.5	8.1	8	11
11	11	119	6	4.8	0	112.5	5.6	5	9	229	11.5	6.5	15
9	9	60.5	3	3	0	95.5	4.7	4	3	117.5	5.9	5.5	11
13	13	171	8.6	5	1	115.5	5.8	5	4	342.5	17.1	14.5	11
12	12	98.5	4.9	4	1	126	6.3	4.2	3	183.5	9.2	8	12.5
10	10	72	3.6	3.5	0	101.5	5.1	4.3	1	280	14	9	11
15	15	88	4.4	4.5	0	76	3.8	4	0	115.5	5.8	4.8	7
16	16	80	4	3.75	0	87	4.4	4	1.5	130.4	6.5	5.5	8
9	9	79	4	3.5	0	106	5.3	4.5	1	316	18	15.3	12
14	14	85.5	4.3	4.2	.5	47.5	2.3	2	1	40	2	2	5
13	13	72	36	3.5	1	110.5	5.5	4	1	131	6.5	6.75	9
13	13	81.5	4	4	0	127.5	6.4	5.5	2	148.5	7.7	6	3
10	10	96.5	4.8	4	0	115	5.8	5.8	2	216.5	10.6	6.8	11
12	12	78.5	3.9	3.5	2	74	3.7	3.5	3	111	5.6	4.3	15
14	14	71	3.5	3.5	0	....	....	....	....	....	....	....	....
15	15	78.5	3.9	3.8	3	72	3.6	3.6	.5	96.5	4.8	4	3
15	15	82.5	4.1	3.5	2	54.5	2.7	2.5	2.5	99	5	4	4
12	12	100.5	5.03	4	0	60.5	3	2.5	0	245	12.3	4.3	1
15	15	53	2.6	2.8	2	76	3.8	3	4	121	6	4.8	6
15	15	34.5	1.7	1.5	1	35	1.8	1.5	2	60	3	2.5	5
15	15	63	3.3	3	0	77.5	3.9	3.3	2	91.5	4.6	5	3
17	17	53.5	2.7	2.8	1	60	3	2.8	2	155.5	7.8	6.5	9
8	8	79	4	2.8	2	94.5	4.7	3	3.5	231	11.5	10	14
15	15	58.5	2.9	2.5	0	74.5	3.7	2.5	3	87.5	4.4	4.3	4
16	16	63	3.2	2	0	67.5	3.9	3	1	127	6.5	5.5	7
12	12	55.5	2.8	2.5	0	76.5	3.8	3	0	175	8.8	5	2
15	15	31.5	1.6	1.5	0	55.5	2.8	2	3.5	96.5	4.8	3.7	6.5
16	16	87.5	4.4	4.1	1	125	6	4.8	1	189.5	9.5	8.8	5
15	15	55	2.8	2.8	0	58.5	2.9	2.8	2	89	4.5	3.5	4
16	16	55	2.8	3	0	69	3.5	3	0	150.5	7.5	4	5
15	15	65.5	3.3	3	0	58	2.9	3	2	111	5.6	4.3	6
15	15	37.5	1.9	2	0	51	2.6	2	0	56	2.8	2.5	0
12	12	94.5	4.7	4	1	93.5	4.7	4.5	1.5	246	12.3	11.3	3
18	18	79	4	4	1	82.5	4.1	4	1.5	117.5	5.9	5.8	3
14	14	79.5	4	3.5	0	123.5	6.2	3	1	136.5	6.8	6	7
17	17	57.5	2.8	2.8	0	66.5	3.3	3	1	119	5.9	3.5	3
12	12	54.5	2.7	2.3	0	91	4.5	3.5	.5	166	8.3	6	6.5
19	19	89	4.5	4.3	0	78.5	3.9	3.5	1	120	6	6	4
17	17	48.5	2.4	2	1	49.5	2.5	2	1	78	3.9	3	7
14	14	75	3.8	3	0	66.5	3.3	2.5	2	152.5	7.6	5.8	6
15	15	112.8	5.6	2.5	1	103	5.2	4	4	124	6.2	4.5	5
14	14	69.5	3.5	3	1	82.5	4.1	3	4	171.5	8.6	6.5	8
17	17	69.5	3.5	3	0	83	4.2	4	0	186	9.3	6	6
14	14	37.5	1.9	1.8	0	58.5	2.9	2.8	2	153.5	7.7	4.8	5
16	16	52.5	2.6	2.5	0	67.5	3.4	2.3	3	166.5	8.3	5.5	7
14	14	50.5	2.5	2.5	0	71.5	3.6	3	0	133.5	6.7	4.8	3
13	13	53.5	3.7	3	0	80.5	4	3.5	1	98	4.9	4.3	5

# TABULAT

## II Associatio

(a) Oppo

(b) Part-

(c) Genu

## III Linguistic

(a) Direc

(b) Trabl

(c) Anal



TABULATION III

Associations in 1 Minute					Directions Test						Trabue						
Posites	Part-Whole Genus-Species				A		B		C		B		C		A		
Errors	Correct Associations	Errors	Correct Associations	Errors	Time	Errors	Time	Errors	Time	Errors	Time	Score	Time	Score	Total Time	Average Time	Median
0	9	2	6	1	2:45	2	2:53	3	4:37	3	7:00	15	7:00	10	96.5	4.8	
0	10	2	4	3	3:15	2	3:43	2	7:18	0	3:47	8	3:50	10	95.5	4.8	
55*	9	2	4	3	4:41	3	3:17	3	....	..	....	..	....	..	83	4.2	
2	11	4	6	4	3:35	0	5:10	0	5:23	0	7:00	10	3:05	12	100	5	
4	5	2	6	1	3:49	1	3:36	0	....	..	....	..	....	..	....	....	
1	5	0	4	0	4:07	2	4:10	0	6:55	0	6:00	10	7:00	12	47.5	4.9	
1	11	1	10	1	4:46	2	4:08	2	6:20	1	7:00	12	7:00	8	171.5	8.6	
5	9	2	6	0	2:58	2	2:43	2	5:17	7	5:47	1	7:00	11	119	6	
1	17	2	14	1	1:25	0	1:15	1	2:25	3	3:10	12	3:45	9	60.5	3	
1	12	0	9	1	2:34	0	2:40	1	4:51	0	7:00	8	6:40	13	171	8.6	
3	11	2	15	0	2:52	1	3:14	2	4:11	0	4:03	13	5:31	12	98.5	4.9	
4	10	3	..	..	2:29	0	3:12	1	7:50	2	7:00	12	6:35	10	72	3.6	
2	8	0	17	0	1:55	4	3:15	11	4:17	8	3:13	14	6:35	15	88	4.4	
1	17	0	16	0	2:07	0	1:58	0	2:35	0	6:15	16	7:00	16	80	4	
3	11	1	6	2	3:17	0	2:35	0	3:44	0	7:00	14	7:00	9	79	4	
1	18	0	16	0	2:14	2	2:09	0	2:57	1	7:00	13	7:00	14	85.5	4.3	
3	19	1	15	0	3:01	0	2:12	1	2:45	1	2:35	17	3:53	13	72	36	
0	11	2	18	0	2:10	0	1:58	1	3:14	1	4:20	14	7:00	13	81.5	4	
2	8	1	15	1	2:09	2	2:55	2	2:47	2	5:17	12	3:42	10	96.5	4.8	
1	12	1	8	1	2:52	1	2:28	1	4:10	1	3:50	14	4:07	12	78.5	3.9	
53	15	4	19	1	1:31	2	1:49	0	2:29	2	2:01	17	2:16	14	71	3.5	
1	20	0	20	0	1:40	0	2:00	2	1:31	0	2:09	16	3:43	15	78.5	3.9	
42	19	1	20	0	1:03	1	1:34	0	2:21	1	3:30	16	4:54	15	82.5	4.1	
30	18	2	20	0	1:32	1	1:14	3	2:14	2	2:32	17	7:00	12	100.5	5.03	
55	18	2	18	1	1:15	0	1:20	0	2:39	2	4:30	15	5:45	15	53	2.6	
27	19	0	20	0	1:06	0	:59	0	1:39	1	1:57	17	5:19	15	34.5	1.7	
0	19	1	20	0	1:20	0	1:05	0	2:12	1	2:35	16	5:20	15	63	3.3	
32	19	1	20	0	1:20	0	1:05	0	2:12	1	2:35	16	5:20	15	63	3.3	
0	19	1	20	0	1:20	0	1:05	0	2:12	1	2:35	16	5:20	15	63	3.3	
33	15	2	19	1	1:27	0	1:24	1	2:47	1	3:52	15	4:02	17	53.5	2.7	
1	16	4	15	4	2:20	1	2:01	1	2:27	6	:59	12	1:17	8	79	4	
43	11	1	12	0	1:20	0	1:19	2	1:57	3	2:57	9	3:10	15	58.5	2.9	
4	20	0	20	0	1:46	1	1:45	0	1:59	0	3:51	17	5:36	16	63	3.2	
47	18	2	13	0	1:34	0	1:22	0	2:35	0	7:00	11	7:00	12	55.5	2.8	
0	18	2	20	0	1:07	0	1:15	0	2:03	0	2:02	17	5:52	15	31.5	1.6	
46	15	1	19	1	1:36	0	1:37	1	2:09	1	7:00	10	7:00	16	87.5	4.4	
0	20	0	13	2	1:03	0	1:01	1	1:31	2	4:54	12	3:08	15	55	2.8	
53	20	0	19	0	1:32	0	1:12	0	2:18	0	2:40	19	6:56	16	55	2.8	
0	20	0	19	0	1:32	0	1:12	0	2:18	0	2:40	19	6:56	16	55	2.8	
37	19	0	20	0	1:17	0	1:15	0	2:25	0	4:04	16	5:47	15	65.5	3.3	
0	20	0	20	0	1:17	1	1:28	1	2:01	2	3:17	12	4:03	15	37.5	1.9	
1	15	0	20	0	2:09	0	1:59	1	3:10	0	3:46	10	7:00	12	94.5	4.7	
41	20	0	20	0	2:42	1	1:37	1	2:15	1	6:35	18	6:42	18	79	4	
1	15	2	16	1	1:31	0	1:17	0	2:26	1	7:00	15	7:00	14	79.5	4	
44	18	1	20	0	1:05	0	1:10	0	1:49	0	7:00	16	3:10	17	57.5	2.8	
1	16	1	20	0	1:25	0	1:31	0	2:08	2	7:00	14	7:00	12	54.5	2.7	
41	20	0	11	2	2:15	0	2:00	0	4:43	0	4:42	18	4:26	19	89	4.5	
0	20	0	20	0	1:10	0	1:12	0	1:55	0	4:00	15	7:00	17	48.5	2.4	
57	19	0	20	0	1:38	0	1:42	0	2:32	1	7:00	14	7:00	14	75	3.8	
3	19	0	20	0	1:57	0	1:42	0	3:17	1	7:00	16	6:20	15	112.8	5.6	
54	20	0	20	0	1:31	1	1:29	0	2:25	1	3:27	13	5:45	14	69.5	3.5	
0	20	0	20	0	1:15	0	1:06	0	2:47	4	3:04	18	7:00	17	69.5	3.5	
59	19	0	20	0	:54	0	:56	0	1:28	0	6:34	14	6:07	14	37.5	1.9	
0	19	0	20	0	1:34	0	1:12	0	2:00	0	7:00	14	7:00	16	52.5	2.6	
1	16	0	15	0	1:31	0	1:37	0	2:24	0	7:00	16	7:00	14	50.5	2.5	
59	20	0	20	0	2:02	0	1:37	0	3:21	3	3:35	14	5:50	13	53.5	3.7	

te number of seconds where test is performed in less than 1 minute.



		Analogies				C			
		B							
Median Time	Errors	Total Time	Average Time	Median Time	Errors	Total Time	Average Time	Median Time	Errors
2	1	118.5	5.9	3	6.5	134.5	6.7	5	16
6.3	3.5	238.5	12.0	8.5	7	271.5	13.6	13.5	16
4	8	115.5	5.8	5	6	125	6.3	5	15
4.3	1	132.5	6.6	6	7	206.5	10.3	10	17
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
4	0	133.5	6.7	6.5	4	317.5	15.9	16	11
6.8	4	168	8.4	7.3	11	162.5	8.1	8	11
4.8	0	112.5	5.6	5	9	229	11.5	6.5	15
3	0	95.5	4.7	4	3	117.5	5.9	5.5	11
5	1	115.5	5.8	5	4	342.5	17.1	14.5	11
4	1	126	6.3	4.2	3	183.5	9.2	8	12.5
3.5	0	101.5	5.1	4.3	1	280	14	9	11
4.5	0	76	3.8	4	0	115.5	5.8	4.8	7
3.75	0	87	4.4	4	1.5	130.4	6.5	5.5	8
3.5	0	106	5.3	4.5	1	316	18	15.3	12
4.2	.5	47.5	2.3	2	1	40	2	2	5
3.5	1	110.5	5.5	4	1	131	6.5	6.75	9
4	0	127.5	6.4	5.5	2	148.5	7.7	6	3
4	0	115	5.8	5.8	2	216.5	10.6	6.8	11
3.5	2	74	3.7	3.5	3	111	5.6	4.3	15
3.5	0	.....	.....	.....	.....	.....	.....	.....	.....
3.8	3	72	3.6	3.6	.5	96.5	4.8	4	3
3.5	2	54.5	2.7	2.5	2.5	99	5	4	4
4	0	60.5	3	2.5	0	245	12.3	4.3	1
2.8	2	76	3.8	3	4	121	6	4.8	6
1.5	1	35	1.8	1.5	2	60	3	2.5	5
3	0	77.5	3.9	3.3	2	91.5	4.6	5	3
2.8	1	60	3	2.8	2	155.5	7.8	6.5	9
2.8	2	94.5	4.7	3	3.5	231	11.5	10	14
2.5	0	74.5	3.7	2.5	3	87.5	4.4	4.3	4
2	0	67.5	3.9	3	1	127	6.5	5.5	7
2.5	0	76.5	3.8	3	0	175	8.8	5	2
1.5	0	55.5	2.8	2	3.5	96.5	4.8	3.7	6.5
4.1	1	125	6	4.8	1	189.5	9.5	8.8	5
2.8	0	58.5	2.9	2.8	2	89	4.5	3.5	4
3	0	69	3.5	3	0	150.5	7.5	4	5
3	0	58	2.9	3	2	111	5.6	4.3	6
2	0	51	2.6	2	0	56	2.8	2.5	0
4	1	93.5	4.7	4.5	1.5	246	12.3	11.3	3
4	1	82.5	4.1	4	1.5	117.5	5.9	5.8	3
3.5	0	123.5	6.2	3	1	136.5	6.8	6	7
2.8	0	66.5	3.3	3	1	119	5.9	3.5	3
2.3	0	91	4.5	3.5	.5	166	8.3	6	6.5
4.3	0	78.5	3.9	3.5	1	120	6	6	4
2	1	49.5	2.5	2	1	78	3.9	3	7
3	0	66.5	3.3	2.5	2	152.5	7.6	5.8	6
2.5	1	103	5.2	4	4	124	6.2	4.5	5
3	1	82.5	4.1	3	4	171.5	8.6	6.5	8
3	0	83	4.2	4	0	186	9.3	6	6
1.8	0	58.5	2.9	2.8	2	153.5	7.7	4.8	5
2.5	0	67.5	3.4	2.3	3	166.5	8.3	5.5	7
2.5	0	71.5	3.6	3	0	133.5	6.7	4.8	3
3	0	80.5	4	3.5	1	98	4.9	4.3	5

# TABULATION III

## II Association Tests

- (a) Opposites
- (b) Part-Whole
- (c) Genus-Species

## III Linguistic Tests

- (a) Directions
- (b) Trabue
- (c) Analogies



Case Number	I. Test		Code Test XVI-6		Ingenuity Test XVIII-6			Construction Puzzles								Time
	Induction XIV-2	Time	Errors	Time	Time	Time	A				B					
							A	B	C	Time A-1	Moves A-1	Time A-2	Moves A-2	Time B-1	Moves B-1	
VI																
A-6-5					....	....	....	3:22	57	:17	5	:46	17	:40	11	10:1
VII																
A-6-8	..	....	..	....	....	....	....	:55	7	:12	5	3:12	18	:32	11	...
B-6-9	..	....	..	....	....	....	....	:50	16	:15	5	:64	14	:42	11	...
C-7	+	6:36	6	....	....	....	....	1:11	25	:25	8	2:50	51	:37	11	6:1
D-7	..	....	..	....	....	....	....	:40	7	:21	5	1:25	16	:40	11	...
E-7-2	..	....	..	....	....	....	....	1:25	35	:15	5	1:25	28	:25	13	...
F-7-2	..	8:35	11	....	....	....	....	4:31	38	:12	5	1:24	11	:47	11	7:2
G-7-3	..	....	..	....	....	....	....	3:09	41	:13	5	2:00	31	:36	12	...
VIII																
A-8	+	3:10	2	-	5:00	5:00	5:00	:27	10	:30	10	:43	15	:29	11	4:4
B-8-2	-	....	..	....	....	....	....	:12	8	:10	5	:59	21	1:42	18	9:5
C-8-6	+	5:24	2	....	....	....	....	:70	27	:11	11	:31	21	:40	11	3:4
IX																
A-8-11	-	8:00	4	....	....	....	....	:32	16	:55	7	:28	11	:28	11	4:5
B-9-3	-	4:58	2	....	....	....	....	3:01	40	:16	5	4:55	48	:32	11	10:4
C-9-4	-	3:18	2	-	5:00	4:38	:52	:25	8	:09	5	:58	16	:28	11	6:1
D-9-3	-	4:39	1	....	....	....	....	:17	6	:08	5	:49	13	:35	11	3:0
X																
A-9-10	-	3:45	8	....	....	....	....	1:50	29	:09	5	:39	13	:29	11	5:0
B-10-1	+	3:20	0	+	3:05	5:00	:55	:12	5	:15	5	:34	11	:34	11	5:3
C-10-1	-	2:50	0	-	2:15	5:00	3:00	:27	8	:08	5	:58	11	:27	11	8:2
D-10-2	+	8:46	9	....	....	....	....	:42	11	:12	5	:47	14	:25	11	6:3
E-9-10	+	5:00	11	-	2:10	5:00	5:00	2:05	43	:25	5	:35	11	:21	11	2:5
XI																
A-11-3	+	5:27	8	-	2:00	5:00	5:00	:57	5	:16	5	3:52	14	:30	11	3:1
B-11-3	+	1:44	1	+	:40	5:52	:07	:28	7	:16	5	3:25	61	:32	11	2:2
XII																
A-11-9	+	5:00	1	-	5:00	4:45	4:43	:35	5	:20	5	1:38	39	:22	11	4:1
B-12-1	+	3:02	0	+	5:00	5:00	5:00	:22	6	:17	5	7:35	65	:31	11	2:3
C-12-2	+	2:35	1	+	:18	5:00	4:56	:26	9	:11	5	:32	12	:20	11	5:3
D-12-3	+	2:46	4	+	:50	5:00	:45	....	..	....	..	....	..	....	..	2:0
E-12-4	+	2:35	0	+	5:00	5:00	1:17	:17	8	:12	5	:40	13	:30	11	2:5
F-12-3	+	2:35	0	+	:35	5:00	5:00	:33	13	:08	5	1:29	17	:26	11	3:1
XIII																
A-12-7	-	2:43	1	-	1:45	5:00	5:00	:33	18	:06	5	:31	11	:19	11	4:2
B-12-8	+	5:00	4	+	5:00	5:00	5:00	3:20	101	:08	8	2:39	51	:34	13	4:2
C-12-9	+	3:35	3	+	:55	5:00	1:47	:17	8	:09	5	2:32	27	:27	11	5:4
D-13	+	4:29	2	-	1:20	4:02	1:16	:35	15	:28	5	:48	21	:15	11	2:2
E-13-6	+	4:30	.5	-	3:00	5:00	5:02	1:25	18	:08	5	1:59	30	:22	11	2:3
F-12-10	+	4:31	1	+	5:00	2:00	1:35	1:20	15	:12	5	:37	11	:25	11	4:0
G-13-3	+	3:21	3	+	:18	1:04	6:40	1:32	32	:07	5	:21	11	:25	11	2:2
H-13-6	-	3:07	0	+	2:11	4:25	5:48	2:38	35	:45	18	:59	12	:25	11	1:5
XIV																
A-13-10	+	2:17	.5	-	2:25	:61	:25	:27	6	:09	5	1:57	25	:35	11	4:2
B-13-11	+	1:58	0	+	1:25	5:00	5:00	:14	5	:07	5	:27	12	:19	11	2:1
C-13-11	+	3:12	.5	+	1:18	3:43	1:34	:61	22	:19	6	3:02	51	:23	11	4:5
D-14	+	3:30	4	+	5:00	5:00	5:00	:55	12	:10	5	2:53	21	:35	11	3:4
E-14-1	+	2:51	2	+	:19	:49	:20	:30	8	:21	7	:51	31	:24	11	5:0
F-14-3	+	1:07	0	+	:50	4:45	2:55	1:39	17	:19	16	2:07	17	:28	11	5:2
G-14-4	+	2:17	0	+	4:00	2:19	:20	:11	5	:06	5	4:20	38	:24	11	3:0
H-14-4	+	1:07	.5	+	1:37	3:20	1:55	:17	5	:07	5	:37	11	:35	11	3:2
I-14-6	+	1:21	0	+	3:35	4:39	1:40	:18	17	:05	5	2:31	26	:17	11	2:4
XV																
A-14-9	+	1:32	0	+	:05	2:10	4:5	:31	9	:06	5	:45	14	:18	11	3:2
B-14-10	+	4:50	3	+	3:51	5:00	4:57	:51	6	:07	5	4:24	48	:26	12	7:2
C-14-11	+	2:21	1	+	:55	5:00	4:55	:45	17	:07	5	:27	12	:24	11	6:1
D-15	+	4:10	0	+	2:31	5:00	1:07	:15	5	:10	6	:24	11	:20	11	3:4
E-15	+	1:30	0	+	1:20	2:00	:25	1:10	10	:12	5	1:45	17	:28	11	1:3
F-15-5	+	2:41	0	+	4:15	4:10	4:05	:42	7	:07	5	1:21	12	:17	11	1:2
G-15-6	+	4:25	0	+	:42	4:48	:22	:15	6	:05	5	:39	12	:26	11	2:1
H-15-1	+	3:10	4	+	4:49	6:45	4:57	:20	6	:09	5	7:47	48	:26	11	2:3



## BULATION IV

I		II		Proverbs III		IV		Total		Relative Values			Triangles		Squa
Time	% Accuracy	Time	% Accuracy	Time	% Accuracy	Time	% Accuracy	Time	% Accuracy	% Correct	Total Time	Average Time	Time	Score	Time
1:13	30	7:07	50	....	..	....	..	....	....	..	....	....	....	..	....
...	..	....	..	....	..	....	..	....	....	..	....	....	....	..	....
...	..	....	..	....	..	....	..	5:19*	....	..	....	....	....	..	....
5:15	80	4:14	60	6:01	30	4:45	10	21:15	45	..	....	....	....	..	....
...	..	....	..	....	..	....	..	8:01	....	..	....	....	....	..	....
...	..	11:03	70	8:32	30	12:30	30	32:05	43	..	....	....	....	..	....
7:29	10	....	..	....	..	....	..	....	....	55	335	16.8	....	..	....
...	..	....	..	....	..	....	..	....	....	..	....	....	....	..	....
4:43	50	2:10	40	3:35	20	4:20	20	14:48 6:15	32.5	55	153	7.7	....	..	....
9:53	50	4:30	20	4:36	10	6:00	20	24:59 3:27	25	..	....	....	....	..	....
3:45	70	2:40	50	3:48	10	3:37	20	13:50	37.5	65	294	14.7	....	..	....
4:51	90	11:39	70	7:40	20	7:20	70	31:30 7:11	62.5	..	....	....	....	..	....
0:40	100	5:17	100	5:01	90	7:47	90	28:45 7:41	95	55	192	9.6	5:04	..	3:30
6:15	80	9:39	100	7:45	80	6:04	100	29:43 5:42	90	65	72	3.6	....	..	....
3:00	60	7:48	50	9:12	40	2:48	20	22:48	42.5	60	159	8	....	..	3:59
5:07	80	4:58	100	4:03	90	5:02	80	19:10 6:00	8.75	55	58	2.9	..	..	....
5:35	90	5:45	70	4:14	40	8:24	60	23:58 9:00	65	65	252	12.6	16:19	—	2:14
8:20	100	11:35	70	5:38	90	10:25	80	35:58 6:05	85	65	211.5	10.6	....	..	....
6:35	40	6:14	60	7:10	40	4:19	30	24:18 3:49	42.5	..	....	....	....	..	....
2:57	80	4:38	50	3:51	60	3:48	70	15:14	65	35	163	8.2	2:18	—	3:02
3:17	100	2:42	100	2:20	90	2:50	100	11:09 3:06	95	60	206	10.3	....	..	....
2:20	80	2:25	100	4:50	80	2:50	90	12:25	87.5	75	122	6.1	....	..	....
4:16	100	3:59	80	4:34	100	4:17	100	16:06 2:51	95	70	250	12.5	....	..	....
2:38	90	2:05	80	4:20	90	2:30	100	11:23 5:12	90	..	....	....	....	..	....
5:30	80	5:10	60	5:06	60	5:32	50	20:48 2:56	62.5	..	....	....	....	..	....
2:05	90	3:40	100	2:35	100	3:24	70	11:44 3:37	90	..	....	....	....	..	....
2:59	100	4:41	100	3:51	90	2:55	100	14:26 4:09	97.5	70	140	7	....	..	....
3:11	100	4:31	70	5:27	80	3:26	80	16:35	82.5	75	175	8.8	1:11	—	3:17
4:28	50	4:39	80	4:38	20	4:52	36	18:37 3:32	42.5	65	289	14.4	....	..	....
4:24	70	3:26	90	4:39	70	1:38	90	14:07 4:47	80	70	164	8.2	....	..	....
5:43	90	3:30	80	4:21	100	5:34	80	19:08 2:11	87.5	85	335	16.8	12:40	—	20:02
2:25	60	2:07	50	1:57	90	2:3	50	8:42 3:08	62.5	70	....	....	....	..	....
2:35	90	2:07	100	3:25	100	4:5	80	12:32 3:34	92.5	80	391	19.5	....	..	....
4:05	100	3:21	90	4:16	40	2:3	90	14:15 2:41	80	65	225	11	4:09	—	2:21
2:20	80	2:29	90	2:49	90	3:07	100	10:45 2:16	90	60	100	5	6:34	—	5:44
1:55	100	2:24	100	2:08	100	2:31	100	9:01	100	75	156	7.8	9:31	—	5:09
4:25	100	3:45	100	2:57	100	2:40	70	13:53 3:01	92.5	70	333.5	16.7	....	..	....
2:12	100	3:20	70	2:42	100	3:50	90	12:04 5:43	90	70	126.5	6.3	....	..	....
4:51	100	7:37	100	4:30	90	5:55	80	22:53 4:08	92.5	75	294	14.7	....	..	....
3:47	80	4:19	90	5:21	100	3:03	100	16:30 4:19	92.5	75	306	15.3	....	..	....
5:00	90	5:53	100	4:09	90	2:12	100	17:14 4:27	95	100	207	10.3	28:35	—	1:01
5:27	90	2:22	90	5:21	90	4:36	80	17:46 4:47	87.5	80	168	8.4	9:11	—	1:55
3:05	80	5:03	90	3:45	100	7:14	100	19:07 3:34	92.5	60	109.5	5.4	15:37	—	1:30
3:29	100	3:12	100	2:53	100	4:42	100	14:16 2:34	100	95	451	22.5	2:25	+	8:53
2:46	100	2:49	100	2:10	100	2:32	70	10:17	92.5	75	101	5	....	..	....
3:20	90	4:31	100	5:30	90	8:45	70	22:06 4:11	87.5	95	205	10.2	28:38	—	5:17
7:20	100	4:40	90	2:20	90	2:23	100	16:43 10:27	95	90	241	12	8:02	—	1:32
6:10	80	8:17	70	11:24	100	15:58	90	41:49 2:14	85	100	763	38	15:00	—	1:05
3:45	90	1:33	100	1:46	100	1:52	100	8:56 2:29	97.5	75	147	7.4	6:56	—	9:57
1:35	100	2:09	100	3:18	100	2:53	100	9:55 2:30	100	80	146	7.3	....	..	....
1:41	100	2:24	100	2:47	100	3:06	100	9:58 3:01	100	85	214	10.7	15:47	—	1:45
2:15	100	2:54	100	2:30	100	4:25	100	12:04 3:36	100	95	182	9.1	7:17	—	5:00
2:39	60	4:13	50	3:34	60	3:59	60	14:25	57.5	65	165	8.3	4:48	—	4:10

\* Small numbers = average times



TABULATION IV

Construction Puzzles						Proverbs										Total	%
A		B				I		II		III		IV					
Time A-2	Moves A-2	Time B-1	Moves B-1	Time B-2	Moves B-2	Time	% Accuracy	Time	% Accuracy	Time	% Accuracy	Time	% Accuracy	Time	% Accuracy		
:17	5	:46	17	:40	11	10:13	30	7:07	50	....	..	....	..	.....	....		
:12	5	3:12	18	:32	11	....	..	....	..	....	..	....	..	.....	....		
:15	5	:64	14	:42	11	....	..	....	..	....	..	....	..	5:19*	....		
:25	8	2:50	51	:37	11	6:15	80	4:14	60	6:01	30	4:45	10	21:15	45		
:21	5	1:25	16	:40	11	....	..	....	..	....	..	....	..	8:01	....		
:15	5	1:25	28	:25	13	....	..	11:03	70	8:32	30	12:30	30	32:05	43		
:12	5	1:24	11	:47	11	7:29	10	....	..	....	..	....	..	.....	....		
:13	5	2:00	31	:36	12	....	..	....	..	....	..	....	..	.....	....		
:30	10	:43	15	:29	11	4:43	50	2:10	40	3:35	20	4:20	20	3:42 14:48 6:15	32.5		
:10	5	:59	21	1:42	18	9:53	50	4:30	20	4:36	10	6:00	20	24:59 3:27	25		
:11	11	:31	21	:40	11	3:45	70	2:40	50	3:48	10	3:37	20	13:50	37.5		
:55	7	:28	11	:28	11	4:51	90	11:39	70	7:40	20	7:20	70	7:52 31:30 7:11	62.5		
:16	5	4:55	48	:32	11	10:40	100	5:17	100	5:01	90	7:47	90	28:45 7:41	95		
:09	5	:58	16	:28	11	6:15	80	9:39	100	7:45	80	6:04	100	29:43 5:42	90		
:08	5	:49	13	:35	11	3:00	60	7:48	50	9:12	40	2:48	20	22:48	42.5		
:09	5	:39	13	:29	11	5:07	80	4:58	100	4:03	90	5:02	80	4:48 19:10 6:00	8.75		
:15	5	:34	11	:34	11	5:35	90	5:45	70	4:14	40	8:24	60	23:58 9:00	65		
:08	5	:58	11	:27	11	8:20	100	11:35	70	5:38	90	10:25	80	35:58 6:05	85		
:12	5	:47	14	:25	11	6:35	40	6:14	60	7:10	40	4:19	30	24:18 3:49	42.5		
:25	5	:35	11	:21	11	2:57	80	4:38	50	3:51	60	3:48	70	15:14	65		
:16	5	3:52	14	:30	11	3:17	100	2:42	100	2:20	90	2:50	100	2:47 11:09 3:06	95		
:16	5	3:25	61	:32	11	2:20	80	2:25	100	4:50	80	2:50	90	12:25	87.5		
:20	5	1:38	39	:22	11	4:16	100	3:59	80	4:34	100	4:17	100	4:01 16:06 2:51	95		
:17	5	7:35	65	:31	11	2:38	90	2:05	80	4:20	90	2:20	100	11:23 5:12	90		
:11	5	:32	12	:20	11	5:30	80	5:10	60	5:06	60	5:02	50	20:48 2:56	62.5		
....	..	....	..	....	..	2:05	90	3:40	100	2:35	100	3:24	70	11:44 3:37	90		
:12	5	:40	13	:30	11	2:59	100	4:41	100	3:51	90	2:55	100	14:26 4:09	97.5		
:08	5	1:29	17	:26	11	3:11	100	4:31	70	5:27	80	3:26	80	16:35	82.5		
:06	5	:31	11	:19	11	4:28	50	4:39	80	4:38	20	4:52	36	4:39 18:37 3:32	42.5		
:08	8	2:39	51	:34	13	4:24	70	3:26	90	4:39	70	1:38	90	14:07 4:47	80		
:09	5	2:32	27	:27	11	5:43	90	3:30	80	4:21	100	5:34	80	19:08 2:11	87.5		
:28	5	:48	21	:15	11	2:25	60	2:07	50	1:57	90	2:13	50	8:42 3:08	62.5		
:08	5	1:59	30	:22	11	2:35	90	2:07	100	3:25	100	4:25	80	12:32 3:34	92.5		
:12	5	:37	11	:25	11	4:05	100	3:21	90	4:16	40	2:33	90	14:15 2:41	80		
:07	5	:21	11	:25	11	2:20	80	2:29	90	2:49	90	3:07	100	10:45 2:15	90		
:45	18	:59	12	:25	11	1:55	100	2:24	100	2:08	100	2:34	100	9:01	100		
:09	5	1:57	25	:35	11	4:25	100	3:45	100	2:57	100	2:46	70	3:28 13:53 3:01	92.5		
:07	5	:27	12	:19	11	2:12	100	3:20	70	2:42	100	3:50	90	12:04 5:43	90		
:19	6	3:02	51	:23	11	4:51	100	7:37	100	4:30	90	5:55	80	22:53 4:08	92.5		
:10	5	2:53	21	:35	11	3:47	80	4:19	90	5:21	100	3:03	100	16:30 4:19	92.5		
:21	7	:51	31	:24	11	5:00	90	5:53	100	4:09	90	2:12	100	17:14 4:27	95		
:19	16	2:07	17	:28	11	5:27	90	2:22	90	5:21	90	4:36	80	17:46 4:47	87.5		
:06	5	4:20	38	:24	11	3:05	80	5:03	90	3:45	100	7:14	100	19:07 3:34	92.5		
:07	5	:37	11	:35	11	3:29	100	3:12	100	2:53	100	4:42	100	14:16 2:34	100		
:05	5	2:31	26	:17	11	2:46	100	2:49	100	2:10	100	2:32	70	10:17	92.5		
:06	5	:45	14	:18	11	3:20	90	4:31	100	5:30	90	8:45	70	5:32 22:06 4:11	87.5		
:07	5	4:24	48	:26	12	7:20	100	4:40	90	2:20	90	2:23	100	16:43 10:27	95		
:07	5	:27	12	:24	11	6:10	80	8:17	70	11:24	100	15:58	90	41:49 2:14	85		
:10	6	:24	11	:20	11	3:45	90	1:33	100	1:46	100	1:52	100	8:56 2:29	97.5		
:12	5	1:45	17	:28	11	1:35	100	2:09	100	3:18	100	2:53	100	9:55 2:30	100		
:07	5	1:21	12	:17	11	1:41	100	2:24	100	2:47	100	3:06	100	9:58 3:01	100		
:05	5	:39	12	:26	11	2:15	100	2:54	100	2:30	100	4:25	100	12:04 3:36	100		
:09	5	7:47	48	:26	11	2:39	60	4:13	50	3:34	60	3:59	60	14:25	57.5		



Relative Values			Triangles		Squares	
% Correct	Total Time	Average Time	Time	Score	Time	Score
..	....	....	....	..	....	..
..	....	....	....	..	....	..
..	....	....	....	..	....	..
..	....	....	....	..	....	..
..	....	....	....	..	....	..
55	335	16.8	....	..	....	..
..	....	....	....	..	....	..
55	153	7.7	....	..	....	..
..	....	....	....	..	....	..
65	294	14.7	....	..	....	..
..	....	....	....	..	....	..
55	192	9.6	5:04	..	:30	seen +
65	72	3.6	....	..	....	..
60	159	8	....	..	3:59	—
55	58	2.9	..	..	....	..
65	252	12.6	16:19	—	2:14	+
65	211.5	10.6	....	..	....	..
..	....	....	....	..	....	..
35	163	8.2	2:18	—	3:02	—
60	206	10.3	....	..	....	..
75	122	6.1	....	..	....	..
70	250	12.5	....	..	....	..
..	....	....	....	..	....	..
..	....	....	....	..	....	..
70	140	7	....	..	....	..
75	175	8.8	1:11	—	3:17	—
65	289	14.4	....	..	....	..
70	164	8.2	....	..	....	..
85	335	16.8	12:40	—	20:02	+
70	....	....	....	..	....	..
80	391	19.5	....	..	....	..
65	225	11	4:09	—	2:21	—
60	100	5	6:34	—	5:44	+
75	156	7.8	9:31	—	5:09	+
70	333.5	16.7	....	..	....	..
70	126.5	6.3	....	..	....	..
75	294	14.7	....	..	....	..
75	306	15.3	....	..	....	..
100	207	10.3	28:35	—	:01	+
80	168	8.4	9:11	—	:55	+
60	109.5	5.4	15:37	—	:30	+
95	451	22.5	2:25	+	8:53	+
75	101	5	....	..	....	..
95	205	10.2	28:38	—	5:17	+
90	241	12	8:02	—	:32	+
100	763	38	15:00	—	:05	+
75	147	7.4	6:56	—	9:57	—
80	146	7.3	....	..	....	..
85	214	10.7	15:47	—	:45	+
95	182	9.1	7:17	—	5:00	+
65	165	8.3	4:48	—	4:10	—

# TABULATION IV

1. Induction Test.....(XIV-2)
2. Code Test .....(XVI-6)
3. Ingenuity Test.....(XVIII-6)
4. Construction Puzzles
5. Proverbs
6. Relative Values
7. Four Triangles
8. Three Squares

\* Small numbers = average times

Subject	Early Development	Health	Height	Weight	Sleep	Emotional Make-up	Attitude with Playmates	Much with Adults	Home			Wealth
									Sanitation	Number of Rooms	Neighborhood	
VI A-6-5	N	N—	3' 10"	50	N	Sensitive, Nervous	N	Y	N	5	3	3
VII A-6-8	N	B	4' 1"	52	A	Nervous, Stubborn	B	Y	N	6	3	3
B-6-9	N	N	3' 11"	51	A	Quick-Tempered	N	Y	A	10	2+	2
C-7	N+	A	4' 4"	60	A	Nervous, Happy	N	Y	A+	12	1	1
D-7	B	N	4'	50	N	Mild and Stable	N?	Y	N	10	3	3
E-7-2	A	A	4' 8"	52	N—	Very Nervous	B	Y	N	3	4	4
F-7-2	N	N—	3' 11"	48	N—	Nervous, Temperam't'l	N	No	N+	7	2—	3+
G-7-3	N	N	3' 11"	45	N	Cheerful, Talkative	N	No	N	5	3	3
						Reserved, Silent						
VIII A-8	N	N— Tonsils	4'	59	N	Aggressive, Irritable	N—	Y	A	7	2	3
B-8-2	N	B	4' 2"	60	B	Aggressive, Emotional	N	No	A	10	2	2+
C-8-6	N	A	4' 2"	72	A	Stubborn	B	Y	A	4	3+	3
						Violent Temper						
IX A-8-11	N	N	4' 3"	56	A	Happy, Temperamental	N	No	A	12	1—	2
B-9-3	N	N—	4' 3"	68	N	Visionary, Imaginative	N—	No	B	5	4	4—
C-9-4	A	N	4' 4"	70	A	Intense, Stable	B	Y	A	9	2	2
D-9-3	adopted	B	4' 1"	60	N	Gentle, Serious	A	No	N	6	3	3
X A-9-10	N	B	4' 4"	58	B	Phlegmatic, Nervous	B	Y	N—	5	3	3
B-10-1	B	B+	4' 5"	66	B	Phlegmatic, Nervous	A	No	A	Boards	3	3
						Good-Natured						
C-10-1	N	N	4' 6"	70	N	Quiet	N	No	N	5	3	3
D-10-2	N	N	4' 6"	68	N	Phlegmatic	N	No	N	5	3	3
E-9-10	N	A	4' 5"	71	N	Nervous, Mild	A	Y	A	Hotel	3	2
XI A-11-3	N	N—	4' 8"	72	N	Mild, Gentle	B	No	A	8	3	3
B-11-3	N	A	4' 9"	100	A	Happy	A	No	A	?	2	2
						Quick-Tempered						
XII A-11-9	A	N	4' 8"	78	A	Good-Natured,	N+	No	N	5	3	3
B-12-1	A	B	4' 7"	65	N	Vivacious	N	No	A	12	1	2
C-12-2		B	4' 9"	80		Nervous, Emotional			A		2	2
D-12-3	N	N—	4' 9"	75	A	Well-Balanced	N	No	N	5	3	3
E-12-4	N	N—	4' 5"	60	N	Emotional, Vivacious	N	No	N	6	3	3
F-12-3	N	N+	4' 7"	90	A	Robust	A	No	A	12	2+	2
						Good-Natured						
XIV A-13-10	N	N+	5' 1"	102	A	Manly, Studious	A	No	A	10	1	2+
B-13-11	N	A	5' 1"	107	A	Manly, Stable	A	No	A	7	2	2
C-13-11		N	5' 1"	109		Phlegmatic	N	Y	N	4	4	4
D-14-	B	B	4' 10"	70	B	Nervous, Vivacious	N	No	N	6	3	3
E-14-1	B	B	4' 6"	93	N	Emotional	N	No	N	5	3	3
F-14-3	N	A	5' 3"	113	A	Moody, Quiet	N	No	N	5	3	3
G-14-4	B	A	5' 2"	96	A	Practical, Quiet	A	Y	A	7	3	3
H-14-4	N	N+	5' 2"	125	A	Rational	B	No	A	7	3	3
I 14-6	N	B	5' 2"	90	B	Sensitive, Artistic	N	Y	A	8	3	3
						Timid, Quiet						
XIII A-12-7	N	A	4' 6"	72	N	Good-Natured	N	No	N	6	3	3
B-12-8	B	B	4' 2"	69	N	Temperamental	B	No	B	6	4	3
C-12-9	B	A	4' 9"	100	A	Childish	A	Y	A	6	3+	3
D-13-3	N	N	5'	88	N	Quick-Tempered	A	No	A	?	2	2
E-13-6	N	A	4' 8"	93	N+	Timid, Slow-Appearing	N	No	N+	7	3	3
F-12-10	N	B	5' 2"	98	A	Good-Natured	A	No	A	12	2+	2
G 13-3	N	N—	4' 4"	95	A	Practical	A	No	A	10	3+	2
H-13-6	B	B	5' 3"	85	N	Quiet, Reserved	B	Y	A	10	2+	2
						Stable, Manly						
XV A-14-9	N	A	5' 9"	153	A	Reasonable	A	No	N		3	3
B-14-10	N	N—	5' 4"	97	N	Quiet, Nervous	N	No	N	6	3	3
C-14-11	B	B	5'	98		Quiet, Precise	B	Y	N	4	4	4
D-15	N	N—	5' 3"	100	N	Artistic, Rational	N	Y	A	15	1	1
E-15	A	A	5' 8"	130	N	Shrewd, Quiet	A	No	N	9	2	3
F-15-5	N	A	5' 5"	129	A	Good-Natured	A	No	A	8	2	2
G-15-6	B	A	5' 7"	133	A	Cheerful, Impulsive	N	Y	A	8	2	2
H-15-1	N	N	5' 6"	112	A	Happy, Executive	N	No	B	4	4	4
						Reserved, Sensitive						
						Sulky, Suspicious						
						Quick-Tempered						



TABULATION V—SOCIAL DATA

Wealth	Home Influences										
	Culture	Divorce	Mother Work?	Child Work?	Religion of Parents	Home Education	Educational Play—Games	Travel	Home Duties	Discipline	
3	3	No	No	No	United Presbyt. Protestant	Solely	A	3	N	Strict	
3	2+	No	No	No	? Will not tell	A	N	2	N	Easy	
2	1	No	Writes	No	Episcopal	Incidental	N	2	None	Easy	
1	1	No	No	No	Not Orthodox	A	A	2	N	Mild-Firm	
3	1	No	Music T.	No	Unitarians	A solely	A	3	None	Poor	
4	3	Yes	Sewed	Movies	Non-Orthodox	A	A	3	None	Poor	
3+	3	No	No	No	Jewish	N Incidental.	N	3	N+	Firm	
3	3	No	No	No	Congregational	A			N	Strict	
3	2+	No	No	No	Ch. Scientist	A+	A+	3	B	Poor	
2+	3	No	No	No	Orth. Jewish	Incidental B	Chess A	3	N	Strict	
3	3+	Yes	Yes	No	Unorthodox	A	A	3	B	Poor	
2	1+	No	No	No	Non-Orthodox	A Inc.	A+	2	N	Strict	
4-	4-	No	Music T.	No	Non-Orthodox	B	B	2	B	Poor	
2	2+	No	No	No	Ch. Scientist	A	A	2	B	Firm	
3	3	No	No	No	None	A	B	2	N	Good	
3	2	No	No	No	M-Catholic	A	A	2	N	Strict	
3	3-	No	No	No	F-Unitarian	Incidental B	A	2	A	Strict	
3	4	No	No	No	Baptist	A	N	3	None	Easy	
3	3	No	No	No	Catholic	A		3	N	Strict	
2	2	No	No	No	Congregational	A	A+	1	None	Very Mild	
3	2	No	No	No	Non-Orthodox	A					
3	2	No	No	No	None	N Inc.	N+	3	None	Strict	
2	1	Mother in Asylum	No	No	Presbyterian	A	A	1	None	Rational	
3	2	No	Teacher	No	Congregational	A	A	2	B	Rational	
2	1+	No	No	No	Non-Orthodox	A Inc.	A+	2	N	Easy	
2	2	No	Teacher	Sold Papers	Unorthodox	A	A	2	A	Strict	
3	3	No	No	No	Congregational	N	A	2	A	Strict	
3	1	No	Teaches	No	Nominal Catholic	B Inc.	N	2	B	Mild	
2	3	No	No	No	Orth. Jewish	Incidental N	B	2	A	Strict	
2+	3+	No	No	No	Christian	A Inc.	N+	3+	B	Strict	
2	1	No	No	No	M-Catholic	Incidental A	A	1+	A	Strict	
4	2	Yes	Pub. Mkt.	Yes	Chil. Epis.	Incidental A	None B	1	A	Rational	
3	1	No	Teacher	No	None	B Inc.	N	2	B	Mild	
3	3	No	No	No	Nominal Catholic	N	N	3	N	Lax	
3	3	No	No	No	Unorthodox Jew	N+	N+	3	A	Rational	
3	2	No	No	No	None	N+	N+	3	A	Strict	
3	2	No	Keeps Boarders	No	Unorthodox	A	A	1	A	Strict	
3	2-	No	No	No	Protestant	A	Boys' A toys	3+	N	Mild	
3	3	No	No	No	M-Ch. Scientist	A	A	2	A	Rational	
3	4	No	No	No	Orth.-Jewish	N	?	3	B	Lax	
3	3	No	No	No	Unorth.-Jewish	A	A	2	B	Poor	
3	2	No	Teacher	No	Unorthodox	A	A	3+	A	Firm	
2	2	No	Teacher	Paper Rt. Draughting	Unorthodox	A	A	2	A	Strict	
3	2	No	No	No	Unorthodox	Ex. Music N	N	3	N	Strict	
2	1	No	No	No	Episcopalian	A Inc.	A	2	A	Strict	
2	2	No	No	No	New Thought	Incidental A	A	1	A	Strict	
2	2	No	No	No	Episcopalian	A	A	3	B	Rational Firm	
3	3	No	No	No	Unorth. Jewish	Incidental N	N	3	B	Lax	
3	3	No	No	No	None	Incidental N	N+	2	N	Mild	
4	2	Yes	Pub. Mkt.	Yes	None	Incidental A	None B	1	A	Rational	
1	3	No	No	No	None	Incidental A	A	1	None	Strict	
3	3	No	Teacher	Yes (little)	None	A				Rational	
3	3	No	Teacher	Yes (little)	Catholic	N Inc.	N	3	N	Firm	
2	2	No	No	No	Methodist	A Inc.	N	2	A	Rational	
2	2	No	Music T.	No	Presbyterian	A	N	2	None	Strict	
4	5	No	No	(Dept. Yes Store)	Methodist	Incidental B	B	4	N	Firm Irrational Poor	



TABULATION V—SOCIAL DATA

Home Influences											
Wealth	Culture	Divorce	Mother Work?	Child Work?	Religion of Parents	Home Education	Educational Play—Games	Travel	Home Duties	Discipline	
3	3	No	No	No	United Presbyt. Protestant	Solely	A	3	N	Strict	
3	2+	No	No	No	? Will not tell	A	N	2	N	Easy	
2	1	No	Writes	No	Episcopal	Incidental	N	2	None	Easy	
1	1	No	No	No	Not Orthodox	A	A	2	N	Mild-Firm	
3	1	No	Music T.	No	Unitarians	A solely	A	3	None	Poor	
4	3	Yes	Sewed	Movies	Non-Orthodox	A	A	3	None	Poor	
3+	3	No	No	No	Jewish	N Incidental.	N	3	N+	Firm	
3	3	No	No	No	Congregational	A			N	Strict	
3	2+	No	No	No	Ch. Scientist	A+	A+	3	B	Poor	
2+	3	No	No	No	Orth. Jewish	Incidental B	Chess A	3	N	Strict	
3	3+	Yes	Yes	No	Unorthodox	A	A	3	B	Poor	
2	1+	No	No	No	Non-Orthodox	A Inc.	A+	2	N	Strict	
4—	4—	No	Music T.	No	Non-Orthodox	B	B	2	B	Poor	
2	2+	No	No	No	Ch. Scientist	A	A	2	B	Firm	
3	3	No	No	No	None	A	B	2	N	Good	
3	2	No	No	No	M-Catholic	A	A	2	N	Strict	
3	3—	No	No	No	F-Unitarian	Incidental B	A	2	A	Strict	
3	4	No	No	No	Baptist	A	N	3	None	Easy	
3	3	No	No	No	Catholic	A		3	N	Strict	
2	2	No	No	No	Congregational	A	A+	1	None	Very Mild	
		No	No	No	Non-Orthodox	A					
3	2	No	No	No	None	N Inc.	N+	3	None	Strict	
2	1	Mother in Asylum	No	No	Presbyterian	A	A	1	None	Rational	
3	2	No	Teacher	No	Congregational	A	A	2	B	Rational	
2	1+	No	No	No	Non-Orthodox	A Inc.	A+	2	N	Easy	
2	2	No	Teacher	Sold Papers	Unorthodox	A	A	2	A	Strict	
3	3	No	No	No	Congregational	N	A	2	A	Strict	
3	1	No	Teaches	No	Nominal Catholic	B Inc.	N	2	B	Mild	
2	3	No	No	No	Orth. Jewish	Incidental N	B	2	A	Strict	
2+	3+	No	No	No	Christian	A Inc.	N+	3+	B	Strict	
2	1	No	No	No	M-Catholic	Incidental A	A	1+	A	Strict	
4	2	Yes	Pub. Mkt.	Yes	Chil. Epis.	Incidental A	None B	1	A	Rational	
3	1	No	Teacher	No	None	B Inc.	N	2	B	Mild	
3	3	No	No	No	Nominal Catholic	N	N	3	N	Lax	
3	3	No	No	No	Unorthodox Jew	N+	N+	3	A	Rational	
3	2	No	No	No	None	A	A	1	A	Strict	
3	2—	No	Keeps Boarders	No	Unorthodox	A	Boys' A toys	3+	N	Mild	
3	2—	No	No	No	Protestant	A				Rational	
3	3	No	No	No	M-Ch. Scientist	A	A	2	A	Mild	
		No	No	No						Rational	
3	4	No	No	No	Orth.-Jewish	N	?	3	B	Lax	
3	3	No	No	No	Unorth.-Jewish	A	A	2	B	Poor	
3	2	No	Teacher	No	Unorthodox	A	A	3+	A	Firm	
2	2	No	Teacher	Paper Rt. Draughting	Unorthodox	A	A	2	A	Strict	
3	2	No	No	No	Unorthodox	Ex. Music N	N	3	N	Strict	
2	1	No	No	No	Episcopalian	A Inc.	A	2	A	Strict	
2	2	No	No	No	New Thought	Incidental A	A	1	A	Strict	
2	2	No	No	No	Episcopalian	A	A	3	B	Rational	
		No	No	No						Firm	
3	3	No	No	No	Unorth. Jewish	Incidental N	N	3	B	Lax	
3	3	No	No	No	None	Incidental N	N+	2	N	Mild	
4	2	Yes	Pub. Mkt.	Yes	None	Incidental A	None B	1	A	Rational	
1	3	No	No	No	None	Incidental A	A	1	None	Strict	
3	3	No	Teacher	Yes (little)	Catholic	N Inc.	N	3	N	Rational	
2	2	No	No	No	Methodist	A Inc.	N	2	A	Firm	
2	2	No	Music T.	No	Presbyterian	A	N	2	None	Strict	
4	5	No	No	(Dept. Yes Store)	Methodist	Incidental B	B	4	N	Rational	
		No	No							Firm	
		No	No							Strict	
		No	No							Rational	
		No	No							Firm	
		No	No							Irrational	
		No	No							Poor	



Occupation of Father	Heredity			Ability of Subject			
	Race	Longevity	Capability	Special Talents	School Record	Best Subject	Poorest Subject
Teacher	Mixed	N	3	Linguistic	None	Reading	Mathematics
Jeweler	Eng. Scotch Irish	A	2	Linguistic	1	Language	Music
Publisher	German Yankee	N	1	Linguistic	None	.....	.....
Mining Expert	Mixed	N	1	Rational	1	.....	.....
Attorney	English	A	2+	Music	None	.....	.....
R. R. Clerk	Mixed	A	3	Ling., Dramat.	4	Reading	Writing
Cashier	German Jewish	N	3+	Linguistic	1	Reading	None
Minister	Mixed		3	Reading		Reading	None
R. R. Engineer	English Mixed	N	2	Linguistic	2	Reading	Writing
Dist. Mgr. Corp.	Jewish	N	2+	Rational	3	Arithmetic Music	Writing
Architect	Mixed	A	2+	Linguistic	4	Reading	Writing
Playwright	English Scotch			Dramatic		Dramatic	
Dpt. Store Mgr.	Irish Hug. Jew	N-?	1	Artistic	1	Reading	Arithmetic
Druggist	Swedish Russian Jew.	N	2	Sloyd, Dramat.	3	Sloyd	Writing
	Dutch Eng. French	N	2	Ling., Rational	1	Hist., Lang.	Writing
Real Estate	Not known		3	Linguistic	1	Read., Lang.	Writing
Attorney	Mixed	N	2	Hist., Rat.	2	History	Drawing Writing
Travelling Salesman	German Scotch-Irish	N	2	Rational	1	Hist., Arith.	None
Salesman	Irish	N	3	Memory for Geog. Hist.	3	Geography	None
Minister	Mixed		3	Linguistic			
Dept. Store Buyer	Mixed	N—	2	Rational	3	Arithmetic	Writing
Accountant	Mixed	N+	2	Linguistic	1	Literature	None
Physician	Mixed		M—5 F—1	Hist., Math.	1	History	Free-hand Drawing
Minister	Mixed	N	2	Linguistic	4	History	Mathematics
Playwright	Mixed		1	Danc'g, Dram.	2	Dramatics	Writing Arithmetic
Banker	Mixed	A	2	Mechanics	2	.....	.....
Mechanic	Mixed, German	B		Music, Ration'l	1	Geog., Hist.	None
Teacher-Lang.	Spanish	N	1	Lang.	1	Lang.	None
Grocer	Russian			Quick		Span., Eng.	
	Jewish	N	2	Rational	1	Mathematics	None
Wholesale Hardware	Mixed	N	3+		1	Eng.	Orat., Eng.
Doctor	Dutch			Manual, Art		All-round	
R. Revolutionist	French	B	1	Rational	1	Good	None
Tailor	Russian	A	3	Music		Average	
Teacher-Lang.	Jewish	N	1	Lang.	3	in all	Sewing
	Spanish	N		Music, Ling.	1	Lang., Rational	None
	Russian			Rational			Phy., Geog.
Jeweler	Jewish	A	2	Math.	1	Mathematics	Drawing
Bookkeeper	Mixed	N	3	Rational	2	Latin	History
Accountant	English	A	2	Latin	1	Drawing	
Consulting	Mixed			Music	1	Gym.	Sewing
Engineer	Mixed	N	2	Rational	5-2	Linguistic	Arithmetic
Salesman	Mixed	N	3	Rational	2	General Science	
	Scotch					Latin	Sloyd
Small Merchant	Jewish	?	3	Music	3—	?	?
Printer	Jewish	A	3	Music	5	Eng. Music	Span., Algebra Writing
Carpenter	Mixed	N	3	Drawing	2	History	Sewing
Banker	Mixed	A	2	Mechanics	1	Mathematics	None
Insurance	Hungarian					Ling.	
	Jewish	?	3	Music	1	Music	Mathematics
Contractor	English	N	2+	Rational	1	Mathematics	Free-h'nd Dwg.
Teacher	Mixed	N+	2	Dramatics	1	Algebra	Writing
Attorney				Music	1	History	Writing Drawing
Court Reporter	Mixed	N	2	Linguistic	1	Eng.	Mathematics
Photographer	Russian						
Travelling	Jewish	N	2	Rational	3	Mathematics	Hand-motor Eng.
Salesman	Mixed	N+	3	Music	2	General Science	
R. Revolutionist	Russian	A	3	Music	3	Botany	Writing
Tailor	Jewish	A		Rational		Music	
Patent Medicine				Linguistic		Harmony	Writing
Druggist	Mixed	A	3	Rational	1—	General Science	
Miner	Dutch, Irish	B	3	Rapid Learner	1	Geometry	Mathematics
Real Estate, Oil	Scotch			Rational	1	All A's	
	Mixed	A	2+	Music	1	Eng., Latin	None Writing Drawing
Photographer	German	A	2	Music	1		
Teamster	French			Rational	1	Lang.	None
	Mixed	A	4—	Rational	4	Arithmetic	Span. Eng.





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